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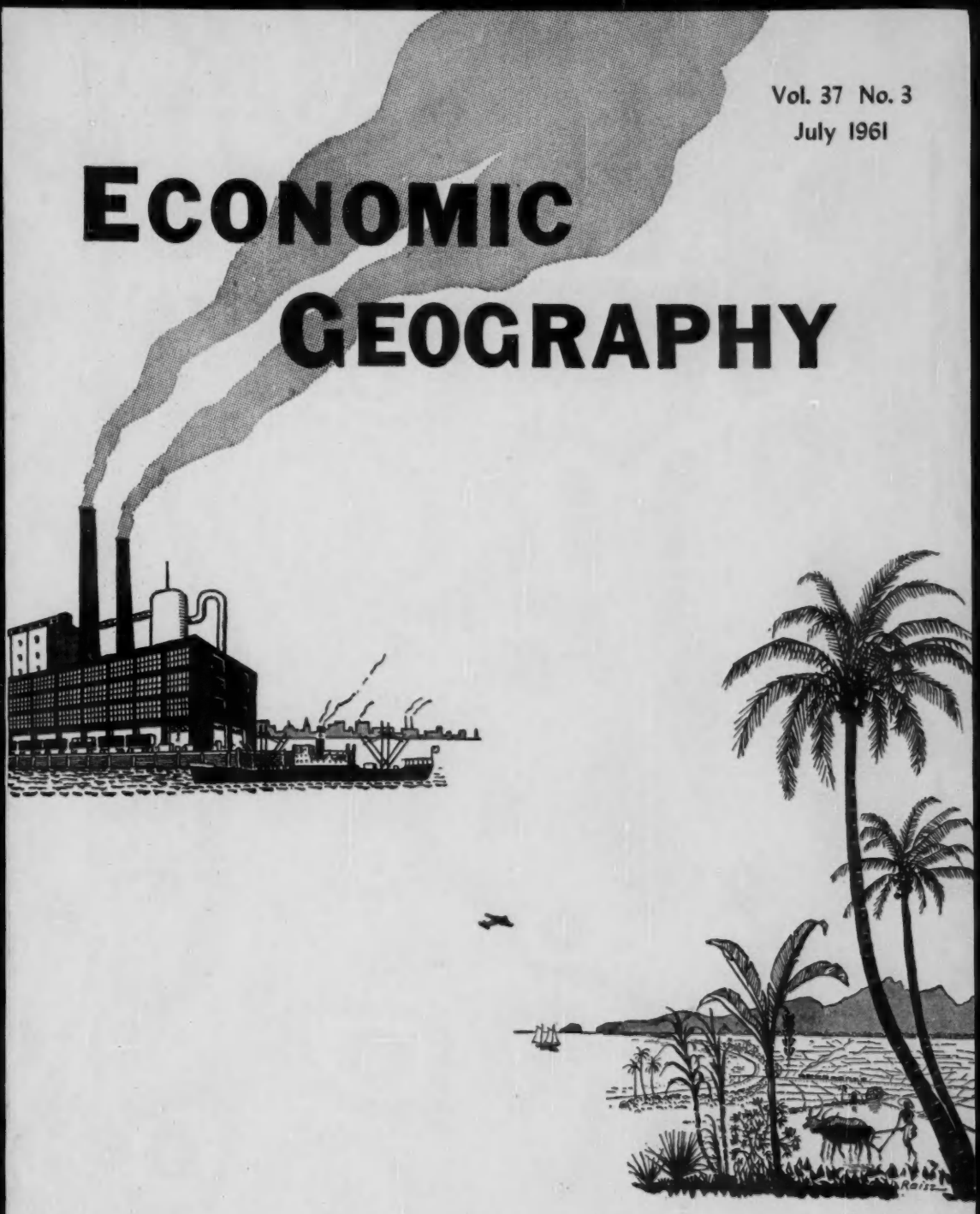

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TWO KINDS OF GEOGRAPHY

In a recent *Guest Editorial* Brian Berry wrote in regard to "the formal approach to geography" that "little interest is evidenced in the peculiarities of individual places or the integration of diverse facts in area because uniqueness and exceptionalism imply a lack of that generality which the 'quantifiers' consider desirable." These words will, no doubt, make many geographers uneasy while other geographers will applaud them. Quite apart from the methods used, is primary concern with generality a desirable attribute for geography?

Scholars have long believed that there are two ways of examining the world, the idiographic way and the nomothetic way. A nomothetic approach may be defined as one in which the avowed purpose is the discovery of general laws. The scholar using the nomothetic approach is interested in particulars only to the extent that they will lead him to the generalities. Most of the social sciences, particularly economics and sociology, are considered primarily nomothetic, however immature their attempts to find laws may be at present. An idiographic approach is one in which primary attention is directed toward individual events or situations. A scholar in a primarily idiographic discipline assumes and uses laws to gain an understanding of the particular situation, but he does not consider it his task to discover such laws. History is a notable example of an idiographic discipline. In a sense, the nomothetic scholar and the idiographic scholar work in opposite directions, and they have different objectives.

What kind of a discipline is geography? Probably in the past geography, or at least human geography, has been more nearly idiographic in nature, although few geographers have thought of the field in these terms. On the other hand, the newer "scientific," largely quantitative, law-seeking school of geography is obviously nomothetic. Contemporary research and teaching in geography is both nomothetic and idiographic. The recognition and understanding of this dichotomy may be important to the future development of our field.

Some geographers will maintain that the idiographic approach is, and will remain, the most valuable one for geographers to take, and that the objectives of the geographer *should* include "the peculiarities of individual places" and "the integration of diverse facts in area." They will claim that geography, like history, fulfills its purpose best as a synthesizing, integrating, interpretive, broadening discipline, and that it is a discipline in which subjectivity and judgment are integral characteristics. These geographers may agree that geography should be a stronger discipline than it is, but they will not agree that the absence of scientific sophistication and goals is the difficulty. Instead, they will argue that the trouble lies in a number of other reasons including the great diversity of opinions among geographers as to what geography is trying to accomplish, and the rather severe unbalance in emphasis on the natural environment.

On the other hand, a growing minority of geographers assert that geography should be nomothetic. These scholars believe that geographers have neglected to make satisfactory use of the newest techniques available to scientists, that they should structure their problems more carefully, that the methods of their research should be quantitative whenever possible, and—most important—that geographic research should be designed to lead towards hypotheses, theories, and laws. Geographers of this school suggest more than simple improvement of the field; they suggest that it be changed from the primarily idiographic discipline that it has been to a field largely nomothetic in nature.

Recognition of the idiographic-nomothetic dichotomy does not in itself answer any questions. For example, it does not tell us whether generality is a desirable attribute. But an awareness of this dichotomy should enable us to consider more intelligently the future course of geography.

WILLIAM R. SIDDALL

ECONOMIC GEOGRAPHY

VOL. 37 JULY, 1961 No. 3

INDUSTRIAL DEVELOPMENT IN THE VANCOUVER AREA

P. D. McGovern

Mr. McGovern was formerly with the Lower Mainland Regional Planning Board of British Columbia. He is now working as a regional planner on the comprehensive survey of the problems of the Belfast area in Northern Ireland.

THE concentration of population and industry in a small part of the central provinces of Ontario and Quebec is a well-known feature of the geography of Canada, and one which has been given considerable study. Unfortunately, the effect has been to divert attention from the significant developments in other parts of the country although in one way or another these are closely related to the trends in the central area. The neglect of these "other parts" is perhaps sufficient justification for this paper on the industrial development of the Vancouver area, but in addition the nature of this development displays several features of particular interest to economic geographers. The Vancouver and other industrial areas outside the central concentration along the St. Lawrence are in the nature of subdominants which have persisted or become established in spite of the strong competition from the center. The reasons for their existence may, therefore, reveal some of the factors which counteract the attraction of the principal concentration of markets and suppliers.

The pace and direction of a region's industrial growth depend on its advantages and disadvantages compared with other regions Fundamentally, these reflect the physical environment, but also various commercial and institutional policies, and from the point of view of an industrialist seeking a location for his plant these may be the decisive factors in his choice of one region rather than another. Accordingly, in assessing the attractions of a region for industry we have to think in terms of the economic environment—a concept which embodies all the influences, physical and otherwise, on the distribution of industry. It is further desirable to describe the economic environment in quantitative and comparative terms, and for this purpose we can use easily obtainable data on the costs of the various factors of production. Freight rates, wage rates, land values, etc., are the basis of most locational decisions even though in some instances the connection may be indirect and tenuous.

The Vancouver area has its quota of the latter; for example, there are firms

which have been attracted to the region by such unique characteristics as (a) distance from competitors in eastern Canada, (b) proximity to parent companies on the west coast of the United States, and (c) the amenities of the region.[1] However, in the final analysis even these firms were influenced by costs in one way or another, and like the majority they located here because they believed, rightly or wrongly, that this region offered a suitable economic environment. The features of this environment are, therefore, worthy of some discussion.

TRANSPORTATION COSTS

The location of Vancouver on the west coast of Canada and over 2000 miles from the nation's principal concentration of markets and suppliers makes transportation costs a major influence on the course of industrial development. Three principal effects are discernible. Freight costs are a heavy burden on manufacturers of low value, bulky commodities in the Vancouver area who seek to compete in distant North American and world markets. The weight of this burden is, in fact, increasing due to the current tendency of the railway companies in the face of increasing competition from the road haulage operators for the more remunerative traffic, to place a disproportionate share of their rapidly rising costs on the low value commodities. On the other hand, transportation costs do not discourage shipment of the more valuable items to distant markets, and by this criterion at any rate peripheral locations such as Vancouver are not necessarily at a competitive disadvantage for this type of production.

Secondly, the very fact of distance from the principal industrial areas of Canada gives manufacturers of certain types of products in the Vancouver area a measure of protection from "outside" competition. The cost of sending relatively low value, perishable, bulky, heavy, or fragile goods from Ontario and more distant parts to western Canada is sufficiently high to encourage the establishment of plants in the "protected" market in the west. However, at the present time the areal extent of this is artificially reduced by the so-called bridge subsidy system. This has the effect of reducing the freight rate paid by manufacturers in the central provinces on shipments to the prairie provinces in view of the large uninhabited part of the Shield which these have to cross. The result is to weaken the competitive position of Vancouver and other western firms in the prairie market and thus offset one of the natural incentives to establish plants in the west.

Thirdly, as a result of Vancouver's geographical situation close to the International Boundary, and on sheltered tidewater, local manufacturers have the opportunity of "exporting" their goods to eastern Canada by American as well as by Canadian railroads, or by sea via the Panama Canal instead of by rail across the continent. The port of Vancouver is undoubtedly one of the basic industries in the regional economy, and one which has encouraged several industries to locate here, but as a stimulus to industrial development the "Panama alternative" is an equally important consequence of the development of port facilities. The effect is to give firms in the Vancouver area lower freight rates on shipments of primary produce than those payable by the Edmonton and Calgary and other western

[1] Much of the material in this paper was obtained by the Lower Mainland Regional Planning Board in the course of interviewing in 1958 all industrial firms in the Vancouver Metropolitan Area with over ten employees (a total of 1100 firms).

industrial areas. The same advantage is obtained by Vancouver firms in their capacity as consumers of steel and other materials. Much of the local demand for such items is met by firms in eastern Canada, who invariably have obtained relatively low agreed charges from the railway companies. Because of the competition by ocean shipping, the freight charge to Vancouver is often considerably lower than to inland centers; for example, the rail rate on 100 pounds of steel from Hamilton to Edmonton is approximately $2.40 while to Vancouver it is only half as much.[2]

LAND COSTS

A feature of British Columbia is the very small part of the total land area which is inhabited or improved. Much of this is in the extreme southwest corner where the Lower Fraser Valley (Fig. 1) affords a relatively easy routeway through the coast batholith, and virtually the only part of the coast with a climate, topography, and soils conducive to intensive agricultural and urban development. This valley has a usable area of roughly 1000 square miles, little more than a quarter of one per cent of the land area of the province, but contains 60 per cent of the population, a large part of the agriculture, and nearly all the secondary manufacturing industry. The latter is in fact concentrated in the Vancouver Metropolitan Area at the extreme western end of the valley where the delta of the Fraser provides extensive waterfront sites for industrial and port development.

Some sections of the waterfront in the Vancouver area are expensive to develop because they either slope steeply down to sea level, or offer only low-lying peat deposits as a foundation for building, and in much of the remainder of the valley a blanket of glacio-marine clays and tills gives rise to costly foundation problems.[3] However, these physical difficulties do not adequately explain why industrial land in the Vancouver area is, generally speaking, considerably more expensive than in other industrial areas in Canada. The extent of the difference is shown in Table I. These prices pertain to serviced industrial land with good foundations within ten miles of the center of the metropolitan area; choice waterfront property on very central sites cost considerably more in all areas, and more distant sites with poor foundations and fewer services generally sell at lower prices.

Speculation is undoubtedly one of the major reasons for the high land values in the Vancouver area. The demand for land to hold has been extremely heavy in recent years because of the very fast pace of development, and because of a general belief that suitable land is very scarce. But although the area of buildable land in British Columbia is limited, it is in fact very much more than is ever likely to be required for building purposes. However, up to the present at any rate land is being bought for speculative and precautionary motives as much as for development with the result that the Vancouver area is at a relative disadvantage in terms of land costs.

TABLE I

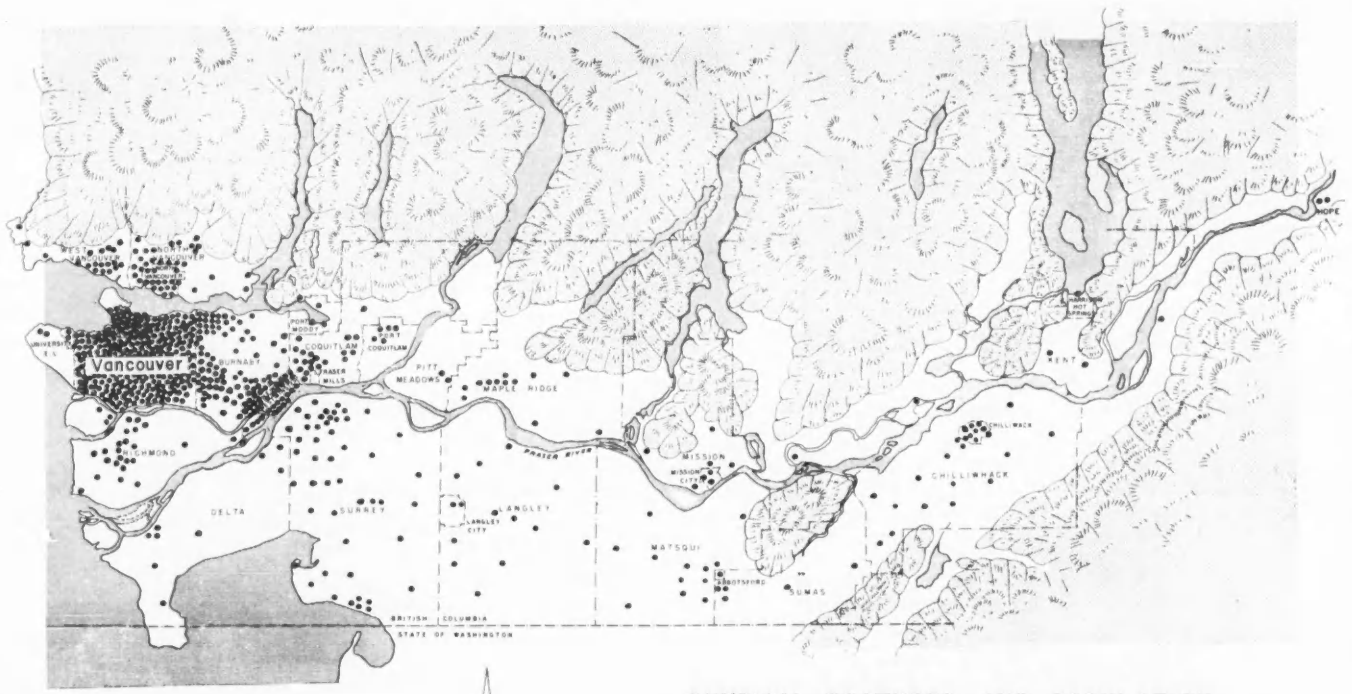
ESTIMATED COST OF SERVICED INDUSTRIAL LAND IN 1959

Metropolitan area	*Dollars per acre*
Vancouver	10,000–20,000
Calgary	4,000–10,000
Edmonton	6,000–15,000
Winnipeg	4,000–10,000
Toronto	6,000–15,000

Source: Industrial Development Commissions.

[2] Information from General Freight Agent of the Canadian National Railways in Vancouver, July, 1959.

[3] J. E. Armstrong: *Surficial Geology of Vancouver Area*, Dept. of Mines and Technical Surveys, Ottawa, 1956.



Prepared by The Lower Mainland Regional Planning Board of B.C.

PHYSICAL FEATURES AND POPULATION
LOWER FRASER VALLEY, BRITISH COLUMBIA

Land over 1500 feet elev. shown hatched.
One dot represents 1000 people in 1956

FIG. 1.

A further reason for this is the sprawling pattern of urban growth. Figure 1 shows that Vancouver is hemmed in on the north by the southern edge of the Coast Range, and on the west by the Strait of Georgia, with the result that the southern and western fringes are having to accommodate a more than proportional share of the development. Excessive subdivision of land in these directions is forcing industry to pay high prices to reassemble parcels of adequate size, or alternatively to "leap-frog" far ahead of the fringe. As a result it is necessary to go much further out from the center in the Vancouver area than in other metropolitan areas to find cheap land in large parcels.

LOCAL MATERIALS

The hinterland of Vancouver contains several of the basic raw materials used by manufacturing industry. The outstanding feature is a huge and sustained yield of softwoods of various types, grades, and sizes. The coastal location of Vancouver enables mills and factories in the area to obtain logs easily and cheaply from all parts of the coast forest district of British Columbia, and the delta of the Fraser and its tributaries provide access and storage space far into the Lower Fraser Valley.

The climate and soils of the Valley provide the natural basis for a large output of dairy produce, vegetables, and small fruits which represents input to the food processing industries. Great possibilities exist of increasing agricultural output by more intensive utilization of the better alluvial soils and by bringing into use a larger part of the boulder clays on the upland areas.[4] Obstacles to this are the increasing competition from other agricultural regions in Canada and the United States, and the loss of some of the best soils in the Vancouver area to urban development. Fortunately, in this area the usual conflict between agricultural land use and the extraction of gravel and other deposits is not likely to arise. Glacial, marine, and fluvial deposits of gravel, clays, and sand are found throughout the metropolitan area and the Lower Fraser Valley; the former offering the advantage of closeness to markets and the latter the attraction of cheap enough land for extensive industries producing relatively low valued non-metallic mineral products.

Oil and natural gas are available to industries in the Vancouver area via pipelines from northern Alberta and the Peace River district of British Columbia. Four refineries with huge built-in capacity for further expansion of output are now established in the area and producing petroleum and by-products. In addition mention has recently been made of a possible new pipeline to carry gas by-products from the northern fields to the Pacific coast to serve the growing markets in British Columbia and northwest United States. These developments are reducing the disadvantages of the Vancouver area compared with the Edmonton area in respect to the basic materials for certain chemical industries.

Many metals are mined in British Columbia, but at present the greater part of the output is exported either as raw ore or after primary smelting. The latter takes place at various locations in the interior of the province closer to the mines and where land, water, and power are cheaper than in the Vancouver area. Deposits of iron ore in the coastal part of the province are proven at 10 million tons and may possibly give rise to a small blast furnace

[4] C. C. Kelly and R. H. Spilsbury: *Soil Survey of the Lower Fraser Valley*, B. C. Dept. of Agriculture, 1939.

unit in the next few years.[5] However, deposits of coking coal on Vancouver Island are of poor quality and virtually exhausted, and it would appear that in regard to input at any rate the Vancouver area is at a disadvantage compared with southeast British Columbia and southwest Alberta as a location for an integrated iron and steel plant. Vancouver has the advantage of large supplies of scrap metal from its port and existing industries, and this has provided the basis for an integrated operation comprising the production of steel ingots, and rolling mill and merchant mill products in the medium-size range.

WATER AND POWER

The Vancouver area is especially well endowed with the natural features basic to a good water supply. The principal source of this at the present time is the southern fringe of the Coast Range Mountains which line the north shore of Burrard Inlet (the Vancouver harbor); these mountains receive an annual rainfall of 125 inches at the intake points, and provide a large year-round source of supply. By their form they also provide suitable sites for storage reservoirs at elevations of 500 to 1500 feet above the main valley. As a result virtually the whole of the Vancouver metropolitan area is supplied with water from a nearby source without any expenditure on pumping. This region starts off, therefore, with natural advantages in respect of water supplies.

However, there are undoubtedly certain disadvantages in the physical features of the area which partly offset the advantages. High costs were incurred in constructing the large dams which are required at the storage reservoirs in the mountains, and distribution mains had to be laid underwater to take the supply across Burrard Inlet to the main body of consumers, and across the Fraser River to meet the demand from the municipalities on the far side of the metropolitan area. In addition the extensive sprawl development in that direction is particularly costly to supply, and as these areas are serviced at the common rate, the result is to raise the cost of water to more favorably situated users. The actual rates charged for water are compared with those of other metropolitan areas in Table II.

In spite of the comparatively low cost of water in the Vancouver area, the rates are high enough to place a considerable burden on heavy water-using industries, with the result that industries of this type have been tending to rely on alternative sources of supply or else locate outside the metropolitan area altogether. Fortunately, alternative supplies of industrial water are readily available from the sea and rivers on the periphery of the area, and from the ground water found in the superficial deposits in the Lower Fraser Valley.

Water is also power in southern British Columbia, and in this regard the physical environment of the Vancouver area appears once again as something of a mixed blessing. Up to the present, practically all the electricity consumed

TABLE II

ESTIMATED COST OF INDUSTRIAL WATER SUPPLIES IN 1959

Metropolitan area	*Consumption level per month*	
	10,000 cu. ft.	*100,000 cu. ft.*
	cents per 100 cu. ft.	cents per 100 cu. ft.
Vancouver	18.0	10.0
Calgary	21.0	13.0
Winnipeg	19.0	12.5
Toronto	20.0	16.5

Source: Industrial Development Commissions.

[5] G. P. Contractor: *Some Aspects of the Canadian Iron and Steel Industry with Particular Reference to British Columbia*, Technical Bulletin No. 21, B. C. Research Council, Vancouver, 1954.

in the Lower Fraser Valley has been generated by the harnessing of natural water power at various sites in the Coast Range. As demand has grown it has been necessary to develop the power potential of more distant parts up to 200 miles to the north, which has meant heavy transmission costs to bring the power across the very difficult terrain between the source of the supply and its consumers. Within the Valley urban development has generally taken place at a much lower density than in the other metropolitan areas in Canada and power distribution costs are consequently higher. In addition the Toronto area, for example, has the important further advantage of a much higher load factor due to the steady demand from the larger proportion of industrial customers and the lack of seasonal variation in industrial activity. The cost of providing electric power to the Vancouver area is, therefore, not as low as the physical endowment might lead one to expect.

In terms of the rates charged to industrial users of electric power, the Vancouver area is in a more favorable position, as shown in Table III. However, these rates are in part the result of the policies adopted by the various power companies, and any changes in these policies would change the relative position of the various areas. In the Winnipeg area the present practice is to charge on the basis of total connected load rather than on actual peak load incurred by the customer, which is the more usual system, and it appears that the Winnipeg rates might be even lower than they are at present if the rate structure were modernized. In the Toronto area the rates charged to residential customers are susidized by increased charges on industry with the result that industrial rates are higher than they might otherwise be.[6]

LABOR COSTS

High labor costs and poor labor-management relations are a feature of British Columbia, and one which management representatives hold responsible for any setback in the fast rate of industrial growth which the province has come to regard as normal. This effect is far from proved, but it is undoubtedly true that, on the average, labor costs in manufacturing and also in the construction, transportation, and service industries have been consistently higher than in any other Canadian province throughout the fifties, without any apparent offset by higher produc-

[6] Brief by B. C. Electric Company to the Royal Commission on the B. C. Power Commission, Vancouver, 1959, p. 31.

TABLE III

INDUSTRIAL POWER RATES IN 1959 (AVERAGE PRICE IN CENTS PER KWH)

Operating system	*3 shifts a day—5 days a week*		*Continuous-round-the-clock*	
Demand level *Consumption level*	*1000 KW* *400,000 KWH/Mo*	*3500 KW* *1,400,000 KWH/Mo*	*3500 KW* *2,100,000 KWH/Mo*	*6000 KW* *3,600,000 KWH/Mo*
Vancouver	1.01	0.87	0.70	0.64
Edmonton	0.95	0.95	0.89	0.88
Winnipeg	0.96	0.83	0.67	0.61
Toronto	0.90	0.90	0.71	0.68

Source: B. C. Electric Company Ltd., Vancouver, 1959.

tivity. Similarly, Vancouver has higher average labor costs than the other major metropolitan areas in Canada.[7]

The basis of labor conflict lies in the fact that the proportion of nonagricultural paid workers belonging to trade unions in 1957 was, in British Columbia, 55 per cent; Ontario, 33 per cent; Quebec, 25 per cent; and Canada as a whole, 34 per cent.[8] This in itself should not discourage industrial development, but Table IV shows that British Columbia has also had more than its share of labor-management disputes culminating in overt strikes.

The relatively unfavorable position of British Columbia and the Vancouver area in these respects is mainly due to the preponderance of strike-prone primary industries such as logging, sawmilling, and construction. The publicity afforded the frequent disputes and wage increases in these industries has encouraged other labor groups to aim high, and has also given rise to an exaggerated view of the labor situation and its retarding effects.

In view of the fast pace of industrial development in the Vancouver area in recent years it is hard to believe that the relatively unfavorable labor costs and attitudes are a serious deterrent to development in this region at any rate. However, locational theory would suggest that they may in fact be exercising an important influence on the industrial structure of the region, and to check this Table V has been prepared. This shows the relative importance of labor costs in the various major groups of manufacturing industry in the Vancouver area, and the rate of growth in employment in each group in recent years. A point of considerable interest is that although growth has taken place in all industries the highest rates of increase have been in those groups (other than foodstuffs) in which labor costs are a relatively small part of total costs.

[7] Dominion Bureau of Statistics: *Review of Man-Hours and Hourly Earnings, 1946–57*, Ottawa, 1958.

[8] S. M. Jamieson: "Cultural Factors Affecting Industrial Relations in B. C.," *Transactions of the Eleventh B. C. Natural Resources Conference*, Victoria, 1958, p. 13.

LOCAL MARKETS

One of the principal factors which is offsetting to some extent the geographical isolation of the Vancouver area is the rapid increase in the size of the local market for manufactured goods. This is the result of a fast rate of population growth combined with a high level of purchasing power and a high rate of spending. It has recently been shown that the British Columbia–Alberta market area has had higher per

TABLE IV

INDUSTRIAL CONFLICT IN B. C.

Year	*Share of Canada's nonagricultural paid workers*	*1941 to 1954*		
		Share of strikes	*Share of strikers*	*Share of man-days lost*
1941	8.0%	11.0%	13.7%	17.5%
1951	8.5%			
1956	9.0%			
Peak years of labor trouble:				
1946		29.2%	28.5%	29.0%
1952		16.2%	38.7%	43.0%

Source: Jamieson in B. C. Natural Resources Conference 1958.

TABLE V

LABOR COSTS AND RATES OF GROWTH, BY MANUFACTURING GROUPS, IN THE VANCOUVER AREA

Group	*Labor costs as % of total costs in 1950**	*Growth in employment 1951–1956*
Transportation equipment	44%	21%
Printing	38	6
Textiles	28	15
Non-ferrous	28	0
Iron and steel	28	35
Wood products	27	0
Paper products	25	47
Non-metallic minerals	25	67
Electrical apparatus	22	60
Chemicals	15	150
Food-beverages	14	0

*Total wages and salaries as percentage of selling value of factory shipments.

Source: From Dominion Bureau of Statistics, *General Review of Manufacturing*, Ottawa, 1951 and 1956 editions.

capita purchasing power than the other market areas in Canada over the past 30 years, and that by 1956 retail sales in British Columbia were higher than in any other western province.[9] The growth of population in the Vancouver area and in British Columbia as a whole over the past 25 years is shown in Table VI. During this period the proportion of the national population resident in British Columbia increased from 6.6 per cent to 8.7 per cent.

The increase in the population of British Columbia in recent years appears to have been mainly due to a large amount of immigration from other parts of Canada and from abroad rather than to any extraordinary rate of natural increase.[10] The majority of the immigrants to the province were no doubt attracted primarily by opportunities of employment and advancement but, although this cannot be proved at the present time, it seems likely that a large number of those who came to the Vancouver area were also attracted by the amenities of the southwest corner of British Columbia just as many other people have been attracted to California in the United States. This is a region with what is generally recognized as a pleasant climate; average temperatures in the Lower Fraser Valley range from 35 degrees in January to 70 degrees in July, and annual rainfall from 35 inches in the western and southern parts of the Valley to 65 inches in the east and north.[11] In addition, Vancouver has natural surroundings of sea and mountain unsurpassed in natural beauty and recreational value by any other region in Canada. Factors such as these have been recognized as an important force in migration patterns in affluent societies.[12]

Thus the amenities of the Vancouver area constitute one of its most important advantages. It is attracting industry directly as was shown at the beginning of this paper, and also indirectly by attracting people in their dual capacity as consumers and labor force. Population growth in the Vancouver area is, therefore, to some extent the spontaneous factor in the development process.

MANUFACTURING EMPLOYMENT

The place of manufacturing in the employment structure of the Vancouver area is illustrated in Figure 2. This shows that only about one quarter of the labor force is directly dependent on manufacturing, and that this is equalled by the service group and far exceeded by the combined total of all the tertiary sectors. Undoubtedly, part of the em-

[9] Western Development and Power Ltd., *The B. C.-Alberta Market, 1925–1975*, Vancouver, 1959.

[10] T. I. Matuszewski: "Population Trends in B. C.," *Transactions of the Eleventh B. C. Natural Resources Conference*, Victoria, 1958, pp. 7–12.

[11] Lower Mainland Regional Planning Board: *The Lower Mainland Looks Ahead*, New Westminster, B. C., 1952.

[12] E. L. Ullman: "Amenities as a Factor in Regional Growth," *Geogr. Rev.*, Vol. 44, 1954, pp. 119–132.

TABLE VI

POPULATION GROWTH IN BRITISH COLUMBIA AND THE VANCOUVER AREA, 1931–1956

	1931	1941	1951	1956
British Columbia	694.3 thous.	817.9	1165.2	1398.5
Vancouver area	379.8 thous.	449.3	649.2	767.2

Source: Census of Canada. Vancouver area figures are those for Census Division 4, B. C.

ployment in the latter is "non-basic" in that it serves rather than stimulates regional growth, but in this region at any rate the tertiary sectors also provide a considerable part of the economic base. Transportation, wholesale distribution, and governmental, business, personal, and recreational services are important functions of the Vancouver area simply because it is the only major Canadian port on the Pacific coast, and the only major urban concentration in British Columbia. The result is a fairly diversified economy with consequent protection against widespread depression and an appeal to immigrants from a wide range of age and occupation groups.

Although not predominantly an industrial center, the Vancouver area is steadily increasing its share of Canadian manufacturing industry. Between 1931 and 1956 the proportion of national output of manufactured goods produced by firms in the Vancouver area increased from 2.6 per cent to 4.3 per cent, and the proportion of national employment in manufacturing from 2.4 per cent to 4.2 per cent. Over this 25-year period the number of people employed in manufacturing in the Vancouver area rose from 12,600 to 56,300 at a fairly constant rate, but with a slowing down during the depression and a speeding up during the war. The principal reasons for the increase are the expansion of the Canadian and international markets for wood and paper products, and the growth of a local market in western Canada for a multitude of other manufactured items.

The changes which have taken place in the structure of manufacturing in the Vancouver area as a result of the developments since 1931 are evident from a comparison of the profiles in Figure 3. During this period the wood-based industries (wood products, pulp and paper) increased their share of the region's manufacturing employment from 27 per cent to 37 per cent. At the same time the food and beverages group (the other large resource-based industry of the region) fell from 28 per cent to 20 per cent, mainly because of productivity increases in the canning

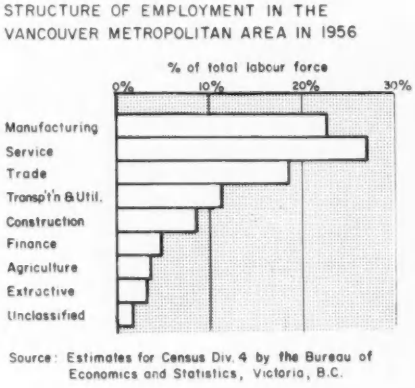


FIG. 2.

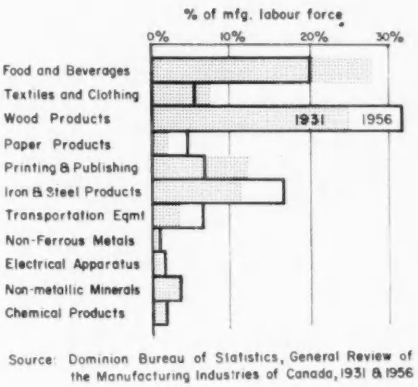


FIG. 3.

and preserving of fish, fruit, and vegetables. The other major change, and a significant one, is the rise from 13 per cent to 20 per cent in the metals and machinery group (iron, steel, and non-ferrous products, and electrical apparatus). Its significance lies in the effect on the range and type of manufacturing carried on in the Vancouver area, because, although obviously this area is still highly specialized in wood products, important trends are discernible which are at once the outcome of the economic and geographical characteristics of the area, and the foundation of the new economic environment facing future developers.

DIVERSIFICATION

The number and variety of the important and distinctive industries in a region provide a summary view of its diversification. In simple quantitative terms an important industry, in the Vancouver area at any rate, can be defined as one employing 1000 or more people, and a distinctive industry as an important industry with a location quotient of 1.5 or more.[13]

The important and distinctive industries in the Vancouver area in 1956 are shown in Table VII. Prominent in this list are the wood products, paper products, and foodstuffs groups; industries with a basis in the raw materials obtained from the coastal forests, the soils of the Lower Fraser Valley, and the rivers and the ocean. The shipbuilding industry is primarily concerned with building fishing vessels, and tugs and barges for the increasing volume of coastal traffic, while industrial machinery is produced in response to the demand by the sawmills, pulp mills, and smelters scattered across British Columbia. On the other hand, the importance of printing, petroleum refining, bakery products, clothing, and sheet metal products is a reflection of the growth of the local market for consumer goods and Vancouver's position as the service center for the whole province.

Three of the industries in Table VII—namely, paper, petroleum and sheet metal products—grew to prominence between 1951 and 1956. Since then further diversification has taken place by the establishment in the region of several industries not previously represented here. The wood and paper groups have gained particle board plants and a fine paper mill. New metal industries include a steel pipe mill, a copper mill, aluminum extrusion and wire rod plants, and the production of copper and aluminum wire and cable. In the non-metallic minerals and chemicals groups the last few years have brought into the region a large cement

[13] The location quotient is calculated by the formula:

$$\frac{\text{No. of employees in the industry in the region}}{\text{No. of employees in all industries in the region}} \div \frac{\text{No. of employees in the industry in the nation}}{\text{No. of employees in all industries in the nation}}$$

TABLE VII

PRINCIPAL MANUFACTURING INDUSTRIES IN THE VANCOUVER AREA, 1956

Industry	*Regional employment*		*National employment*		*Location quotient*
	–1– *Thous.*	–2– %	–3– *Thous.*	–4– %	–5– *Col. 2 ÷ col. 4*
Veneers and plywood	4.1	7.3	11.6	0.9	8.0
Sawmills	9.6	17.0	57.1	4.2	4.1
Shipbuilding	2.6	4.6	17.8	1.3	3.5
Fish processing	1.8	3.1	14.3	1.1	2.8
Machinery, industrial	2.1	3.8	26.6	2.0	1.9
Dairy products	1.4	2.5	20.1	1.5	1.7
Paper boxes and bags	1.0	1.9	15.5	1.1	1.7
Furniture	2.0	3.6	32.7	2.4	1.5
Meat packing	1.5	2.7	24.7	1.8	1.5
Fruit and vegetable preparation	1.0	1.8	16.8	1.2	1.5
Sash, door, and planing mills	1.2	2.1	19.9	1.5	1.4
Petroleum products	1.0	1.8	17.7	1.3	1.4
Printing and publishing	3.0	5.4	56.3	4.2	1.3
Bakery products	1.9	3.4	35.5	2.6	1.3
Sheet metal products	1.0	1.8	20.0	1.5	1.2
Clothing and knitwear	1.7	3.1	111.7	8.3	0.4

Source: Dominion Bureau of Statistics, *General Review of Manufacturing, 1956*, Ottawa, 1959.

plant, plaster board manufacturing, and the production of phenol, chlorine, caustic soda, and sodium chlorate. The latter group is a direct response to the very rapid expansion of pulp and paper production in other parts of British Columbia.

Diversification can also be measured by the number of firms of various sizes in the region. In this case we need a typically diversified economy against which to compare the Vancouver area, and as the Toronto area is generally recognized as the most diversified secondary manufacturing region in Canada it has been used for this purpose. Table VIII shows that in 1956 in the Toronto area the number of employees in manufacturing industry was almost equally divided between small, medium, and large firms which suggests that a balance between the size groups is a feature of a diversified structure. By comparison the Vancouver area had a distribution heavily skewed towards small size of firm. It is significant that between 1946 and 1956 the proportion of employment in each of the three sizes of firm approached closer to the Toronto proportion, a fact which further reveals the trend towards more diversification in the Vancouver area. However, the latter will probably always have a preponderance of small firms because of the relatively small market for most of its products.[14]

PROCESSING

In 1956 thirty-five per cent of the manufacturing employment in the Vancouver area was in primary manufacturing, this being defined as the first-stage processing of raw materials received from the agricultural or extractive sectors. In the same year the figure for Canada as a whole was 23 per cent, and for the Toronto area only 8 per cent. The high proportion in the Vancouver area reflects the predominance of such industries as fish canning and

[14] This point is discussed by Gideon Rosenbluth in his recent book, *Concentration in Canadian Manufacturing Industries*, Princeton University Press, 1957.

TABLE VIII

DISTRIBUTION OF MANUFACTURING EMPLOYMENT BY SIZE OF FIRM IN VANCOUVER AND TORONTO METROPOLITAN AREAS

Size of firm by number of employees	*Percentage of manufacturing employment*		
	Vancouver 1946	*Vancouver 1956*	*Toronto 1956*
Under 100	44	43	35
100 to 500	37	34	35
Over 500	19	23	30
Total manufacturing employment	42 thous.	56 thous.	209 thous.

Source: From D.B.S., *General Review of Manufacturing*, Ottawa, 1946 and 1956 editions.

freezing, fruit and vegetable preparation, dairy products, and sawmilling.

These industries are engaged in the processing of the natural resources of the hinterland of Vancouver for direct sale to the consumer market and the construction industry. Their products do not generally constitute input to other manufacturing industries nor do the materials used offer much opportunity for more advanced processing. However, even in these industries advances are taking place. For example, in recent years the wood products industry in the Vancouver area has been developing plywood plants rather than new sawmill capacity in response to the increasing tendency for plywood to displace sawn lumber in construction, and because the large diameter coniferous trees in the coastal forests give British Columbia an important advantage in plywood production. Changes such as these have been largely responsible for a reduction in the proportion of employment in the primary manufacturing group from 41 per cent to 35 per cent between 1951 and 1956.

Further information on the stage of manufacturing found in the Vancouver area is provided by statistics of the value added to materials by the processing which they receive in the transition from input to output.[15] Table IX shows the major manufacturing groups in the Vancouver area arranged in order of the proportion of value added in the gross value of production, and also comparable figures for Canada as a whole. Some interesting points emerge from a comparison of the regional and national values for the various industries. The considerably larger proportion of value added in the transportation equipment group in the Vancouver area is due to the specialization in shipbuilding, an advanced type of manufacturing. On the other hand the higher percentage in the non-ferrous metals group is due to the *absence* here of primary metal refining for the reasons already given in the discussion of local materials.

In most groups (and particularly in electrical apparatus, chemicals, and paper products) Vancouver is mainly concerned with the production of the relatively low-value items which cannot

[15] "Value added," or the net value of production, is the difference between the gross value of production and the total cost of materials, fuel, and power. Estimates of value added can be calculated for Canadian regions from the official annual reports on manufacturing, although these express value of output in terms of the value of factory shipments which may differ slightly from the gross value of production because of changes in inventories.

TABLE IX

COMPARISON OF VALUE ADDED BY MANUFACTURING IN VANCOUVER AND CANADA IN 1956

Industry	*Percentage of "value added" in factory shipments*	
	Vancouver metropolitan area	*Canada*
Transportation equipment	75.3%	41.3%
Printing and publishing	69.3	66.7
Iron and steel products	50.4	51.9
Non-metallic mineral products	47.9	56.4
Chemical products	43.9	50.5
Rubber, leather, and textiles	43.7	46.7
Wood products	43.0	44.6
Petroleum and coal products	41.5	35.5
Non-ferrous metal products	40.4	35.9
Electrical apparatus	39.8	52.9
Paper products	37.2	48.1
Food and beverages	32.6	34.4

Source: D.B.S., *General Review of Manufacturing, 1956*, Ottawa, 1959.

easily carry the cost of shipment from factories in Ontario and the eastern United States. The more highly manufactured items, on which the burden of transportation costs weighs less heavily, are generally distributed from plants in the principal concentration of industries and markets. However, the growth of the industrial and the consumer markets in western Canada is encouraging the development of a more advanced type of manufacturing in the Vancouver area. This is shown by the fact that 75 per cent of the total increase in manufacturing employment between 1951 and 1956 took place in the first six industries in Table IX.

GROWTH POTENTIAL

Over the period 1951 to 1956 the number of people employed in manufacturing industry in Canada increased by 94,600. Each major group except textiles contributed to this total increase, but 75 per cent of it came from seven groups, namely, transportation equipment, electrical apparatus, iron and steel products, paper products, food and beverages, non-metallic mineral products, and chemicals. These may be called the "booming" industries to distinguish them from the groups with a less significant rate of expansion. In five of these seven groups the rates of growth in the Vancouver area were three to nine times as great as those for the nation as a whole. In transportation equipment the regional rate was slightly greater than the national rate in spite of stagnation in shipbuilding on the Pacific coast. Only in food and beverages did the region's rate of increase fall below the nation's, and here the national increase was also low at 6 per cent. Thus the Vancouver area is sharing in the growth of the nationally booming industries, and developing an industrial structure with built-in growth potential.

Success in this respect is a measure of the buoyancy of a regional economy. In the case of Vancouver this is primarily the result of the high rate of population growth and the more efficient utilization of local natural resources. These are the principal factors behind the development trends already described, but perhaps their most important effect has been to bring about notable changes in the traditional mar-

ket distribution of Vancouver's manufactured products, and so to this we now turn.

INPUT-OUTPUT PATTERN

Until recent years the Vancouver area has been highly specialized in food processing and primary wood products with the result that output of these items was far greater than the local market could absorb. On the other hand, production of many other manufactured goods was far below the level of local demand. Consequently the regional economy was extremely dependent on exports to distant Canadian and world markets in order to pay for its many imports from equally distant producers. Unfortunately, as already stated, the low value, bulky commodities produced from the natural resources of the Vancouver area are subject to relatively heavy transportation costs which weakens the region's ability to compete against producers closer to principal markets. Thus extreme specialization in primary manufacturing placed the Vancouver area in a very vulnerable position as well as limiting the opportunity, by way of industrial linkage, for the production of a wider range, and a more advanced type of product.

However, as a result of the changes in recent years the region is developing a new input-output pattern. Some of the characteristics of this are evident from Figure 4, which provides a summary view of the markets for goods manufactured in the Vancouver area. Many points of interest emerge from this diagram, but the most significant from the present point of view is the fact that the obviously heavy dependence on the traditional exporting of primary products is fairly well balanced by heavy sales of a wide variety of products in the western market. As already explained this is to some extent a protected market for Vancouver firms because of the much greater distance from plants in Ontario. Figure 4 also shows that considerable proportions of some of the more advanced products from the Vancouver area are sold in eastern and world markets. These are mainly items such as power saws, drilling equipment, etc., which have acquired an international reputation after having been developed for local extractive industries.

The market distribution diagram shows, as would be expected, a high proportion of sales within the Vancouver area. A large part of this represents inter-industry transactions, and a study of these shows how industrial linkage is stimulating the build-up of an industrial complex in this region. Some idea of the current linkage can be obtained from Table X. This shows input-output relationships for the manufacturing sector in the regional economy in terms of the number of transactions between firms in the industry groups which buy materials from or sell products to each other.[16] Obviously some industries have greater intra-regional linkage than others. Most of the differences can be explained by the nature of the input or output; firms using mainly imported materials (e.g., the textile group) or local primary produce (non-metallic mineral products) do not buy much from other manufacturing industries within the region, and firms that produce mainly finished goods (transportation equipment) or consumer goods (foodstuffs) do not provide much of the input used by other industries.

A rough measure of the extent of an industry's linkage is provided by the

[16] The input-output concept is a tool which economic geographers might use more freely in regional analysis, even though precise coefficients are not easily obtainable from available statistics.

TABLE X

INTER-INDUSTRY TRANSACTIONS WITHIN THE MANUFACTURING SECTOR IN THE VANCOUVER METROPOLITAN AREA IN 1958

Read down columns for source of input *Read along rows for distribution of output*	*Food and beverages*	*Clothing and textiles*	*Wood products*	*Paper products*	*Metal products*	*Transportation equipment*	*Electrical apparatus*	*Non-metallic mineral products*	*Chemical products*	*Miscellaneous manufacturing*	*Total buyers of output*[1]	*Number of firms in industry*[2]	*Interaction coefficient*[3]
Food and beverages	24	0	0	0	0	0	0	0	1	0	25	99	0.3
Clothing and textiles	0	7	10	4	1	0	0	0	0	0	22	50	0.4
Wood products	2	3	52	4	3	17	2	2	0	6	91	142	0.6
Paper products	12	1	1	10	0	0	0	0	0	17	41	17	2.4
Metal products	10	1	27	2	46	15	6	4	1	11	123	140	0.9
Transportation equipment	0	0	0	0	0	0	0	0	0	0	0	42	0.0
Electrical apparatus	0	0	0	0	0	1	0	0	0	3	4	14	0.3
Non-metallic mineral products	3	0	10	4	7	1	0	7	3	3	38	29	1.3
Chemical products	1	1	9	13	3	1	5	1	8	13	55	29	1.9
Miscellaneous manufacturing	18	2	9	1	8	0	0	7	0	2	47	50	0.9
Total suppliers of input[1]	70	15	118	38	68	35	13	21	13	55	...	...	...
Number of firms in industry[2]	99	50	142	17	140	42	14	29	29	50	...	...	...
Interaction coefficient[3]	0.7	0.3	0.8	2.2	0.5	0.8	0.9	0.7	0.5	1.1	...	...	...

[1] Totals of each row and column.
[2] Number of firms interviewed.
[3] Totals of rows and columns divided by number of firms.

Source: Interviews by Lower Mainland Regional Planning Board of all firms with over ten employees.

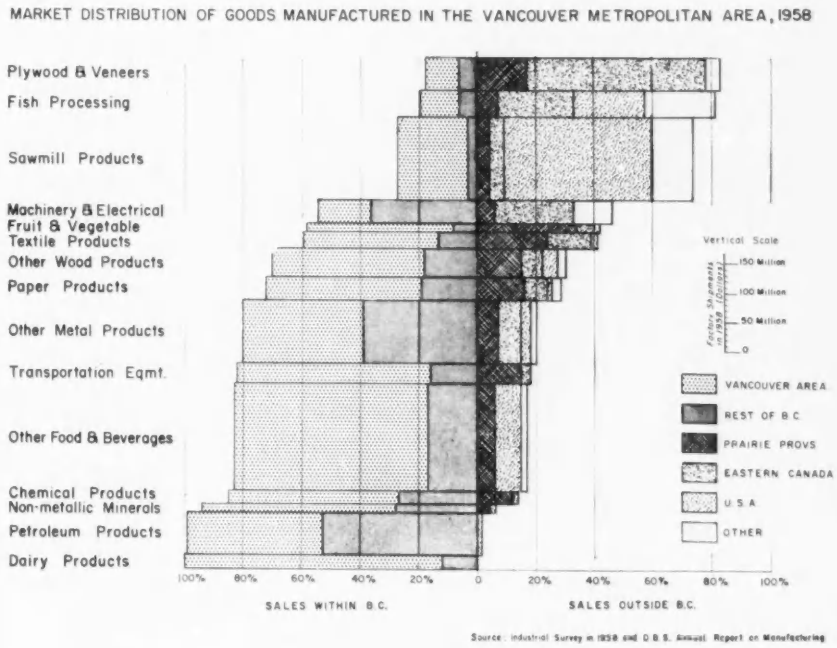


FIG. 4.

totals of each row and column in Table X. These show the importance of the industry to the manufacturing sector in terms of the number of inter-industry transactions performed by it. By this criterion the wood products group (as a purchaser of output) and the metal products group (as a supplier of input) have the most stimulating effect. However, some allowance should be made for the different number of firms in each industry, and the simple "interaction coefficients" shown in the last column and the last row of Table X serve this purpose. These show that, per firm, the paper products group has at the present time the strongest linkage with other firms in the region, both as buyer and seller. The reasons for this bring us right back to the characteristics of the economic environment in which the industry operates.

In recent years a very large expansion of pulp and paper production has taken place on coastal sites on Vancouver Island and other parts of British Columbia. Although very little of this is located in the Vancouver area where land, water, and power are relatively expensive, and timber supplies relatively scarce, waterfront sites in Vancouver and on the delta of the Fraser have attracted several large chemical plants engaged in the manufacturing of products for use in the pulp and paper mills. The section of the paper products industry in which the Vancouver area is directly engaged is the paper converting group. Its basic input consists of paper rolls from the new mills, inks,

wax, glues, and asphalt from local chemical plants, and felt and fibers from the textile group. Principal products are cartons and containers for the local food processing industries, bags for cement and fertilizer plants, roofing papers and paper board for the western construction industry, and a wide range of sanitary paper, wax papers, and labels for the western market.

The high rate of growth of the paper products industry in recent years provides a fine illustration of the importance to the industrial development of the Vancouver area of an increased local supply of materials, and a growing local market for products. Growth in both respects has meant that the disadvantages of the region in respect to transportation costs and most of the other cost factors have had a less retarding effect on its industrial development than might otherwise have been the case.

GEOGRAPHY AND HUMAN ECOLOGY*

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IN a period when academic specialization requires that we spend much of the time talking to ourselves, it may be worth our while occasionally to explore points of contact between neighboring disciplines. If we should find that we are often talking about "the same thing," we may still discover that our perspectives are distinctive and useful for heuristic purposes. As an outsider presuming to deal with another discipline before an audience comprised of specialists in that field, I shall hold my discussion of geography to brief limits, simply outlining my understanding of the field and its current major preoccupations, in order to set out a comparative framework for a discussion of human ecology and its relationships—both actual and potential—with geography.

The Nature of Geography

First of all, I have drawn upon discussions of the field of geography by geographers themselves. A brief survey of the more recent statements concerning the nature of the field suggests that most contemporary practitioners of the art seem to accept Hartshorne's views as they were enunciated over 20 years ago. That is, they have come to the position that "geography does not claim any particular phenomenon as distinctly its own."[1] Moreover, they seem to agree with Hartshorne that "geography seeks to acquire a complete knowledge of the areal differentiation of the world."[2] They have come to accept geography as an integrative, correlative, or synthesizing discipline, one that is essentially analogous to history; and, finally, they see the field as consisting of two main phases—systematic geography and regional geography.

One finds this consensus recorded, for example, in recent statements by Ackerman and Ginsburg, with Ackerman holding that "areal differentiation on the earth" is the fundamental interest,[3] and Ginsburg arguing that "geography is concerned with the ways in which men occupy the surface of the earth, organize themselves spatially, and utilize the world's resources, themselves irregularly distributed, in short, with the *areal organization of society*."[4]

*Revision of a paper presented at a student-faculty colloquium, Department of Geography, University of Wisconsin, April 29, 1960. The comments of Professors John W. Alexander and Richard Hartshorne were extremely helpful, but the writer is entirely responsible for the views expressed here.

[1] Richard Hartshorne, *The Nature of Geography*, Association of American Geographers, Lancaster, 1939, p. 372.

[2] *Ibid.*, p. 359. More recently, he has defined the field as "that discipline that seeks to describe and interpret the variable character from place to place of the earth as the world of man." See Richard Hartshorne, *Perspective on the Nature of Geography*, Chicago, 1959, p. 47.

[3] Edward A. Ackerman, *Geography as a Fundamental Research Discipline*, Department of Geography, University of Chicago, 1958, p. 13.

[4] Norton Ginsburg, "Geography," in Bert F. Hoselitz (edit.), *A Reader's Guide to the Social Sciences*, Glencoe, Ill., 1959, p. 74. These views are also clearly reflected in the remarks of those writers who make definitional statements in Preston E. James, C. F. Jones, and J. K. Wright (edits.), *American Geography: Inventory and Prospect*, Syracuse, 1954.

Geography in the View of Ecologists

Up to this point, we have considered only the testimony of geographers. How do sociologists—and, more particularly, human ecologists—conceive the field of geography? One of the recent volumes devoted to a review of sociology and its subdivisions contains a chapter entitled "Human Ecology and Human Geography"; but the promise of the title is not fulfilled, for only one paragraph is given to human geography, and the subject is dismissed with the remark that it "emphasizes the physical environment itself and man's reciprocal relationship with that environment."[5] It is clear that we must turn to some earlier statements if we are to see how ecologists conceive the field of geography. Quinn's view is probably representative. He asserts that, "Geographers place much greater emphasis on direct relations between man and environment than on the integrated functional-spatial pattern of relations among men, which sociological ecologists emphasize."[6] This conception of geography is elaborated in Ericksen's discussion of the relations between geography and ecology:

> "Undoubtedly there are many points in common between the two disciplines. But the differences between the geographical and ecological approach rest in the fact that geography has as its central interest the correlation between habitat and social factors; that is, the concern is with the direct relationship between man and his habitat. Ecology, however, has as its interest the human community. It is interested in interrelationships. To the ecologist the habitat is only one of numerous major extraneous factors influencing the social factors. While geography is principally concerned with place, ecology is principally concerned with process in time. The geographer studies the physical environment and carries his analysis through to population and cultural considerations. His contribution, as a social scientist, is that human activities are fully intelligible only in relation to the various geographic conditions which have stimulated men in different parts of the world. He points out that theories on population and principles pertaining to agriculture and trade can be made completely valid only after the data for the conclusions are drawn from every part of the world and each fact interpreted in the light of local conditions from which it sprang. Therefore, human ecology as well as sociology, anthropology, and history, should be permeated by geography.
>
> Location, to the geographer, signifies position on the earth's surface. Location to the ecologist, however, signifies position in a spatial grouping of interacting or interdependent human beings and institutions. We can say, then, that human ecology is concerned with the relations between *man* and *man* as influenced, among other things, by his habitat. The geographer, on the other hand, concentrates upon physical environmental factors which determine the location, size and general contour of the community. He is not generally inclined to consider the spatial aspects of division of labor resulting from social change. Finally, the ecologist is conscious of the ecological region being different from the geographic region since the former is a product of contact and division of labor rather than a unity in a physical environment, as the geographer visualizes the region."[7]

Hawley has also given some careful attention to the question of geography's primary focus, and to its relations with human ecology:

> "Human ecology is . . . something different from human geography. Geog-

[5] George A. Theodorson, "Human Geography and Human Ecology," in Joseph Roucek (edit.), *Contemporary Sociology*, New York, 1959, p. 339.

[6] James A. Quinn, *Human Ecology*, New York, 1950, p. 6.

[7] E. Gordon Ericksen, *Introduction to Human Ecology*, Los Angeles, 1949, pp. 6–7. This last remark betrays ignorance of the geographer's concern with "nodal" as well as "homogeneous" regions.

> raphy treats men and their activities in their visible aspects and so far as they may be regarded as distributed phenomena. It does not concern, except incidentally, the interrelations among men. Human ecology, which is also interested in the relations of man to his geographic environment, fastens its attention upon the human interdependences that develop in the action and reaction of a population to its habitat. In other words, while geography views the adjustment of man from the standpoint of modifications of the earth's surface, human ecology makes a detailed analysis of the process and organization of relations involved in adjustment to environment. This brings us to a second point of distinction between the two disciplines. Geography involves a description of things as they are at a point in time; its interest is in distribution rather than development. Ecology, on the other hand, is evolutionary. It undertakes to describe the developmental process as well as the form of man's adjustment to his habitat."[8]

The statements by both Hawley and Theodorson fail to recognize the developmental interests represented in "historical geography," now frequently identified as one of the systematic subdivisions of geography. More important, they present an outmoded conception of the field of geography, holding that direct "environmental influence" is the central focus of the discipline.

Geography as Human Ecology

We could not conclude this brief review without pointing to the fact that an "ecological" point of view was advanced many years ago within geography itself. I refer especially to the presidential address delivered before the American Association of Geographers in 1922 by the late Harlan H. Barrows.[9] In his search for geography's distinctive functions, Barrows hit upon human ecology as the guiding concept. "The center of gravity within the geographic field," he noted, "has shifted steadily from the extreme physical side toward the human side, until geographers in increasing numbers define their subject as dealing solely with the relations between man and his natural environment." Barrows' conclusions were as follows:

> "Thus defined, geography is the science of *human ecology*. The implications of the term "human ecology" make evident at once what I believe will be in the future the objective of geographic inquiry. Geography will aim to make clear the relationships existing between natural environments and the distribution and activities of man. Geographers will, I think, be wise to view this problem in general from the standpoint of man's adjustment to environment, rather than from that of environmental influence. The former approach is more likely to result in the recognition and proper valuation of all the factors involved, and especially to minimize the danger of assigning to the environmental factors a determinative influence which they do not exert."[10]

Needless to say, this programmatic statement did not gain universal acceptance within the geographic fraternity, and it is now little more than a piece of intellectual history, though it should be

[8] Amos H. Hawley, *Human Ecology: A Theory of Community Structure*, New York, 1950, p. 72.

[9] An ecological conception of geography had appeared much earlier, of course, but it failed to attract many adherents at any point in geography's development. "Ratzel, taking his clue from the biological use of the term 'ecology,' once suggested that anthropogeography is, in effect, human ecology. From his point of view, as from that of biology, human ecology would be defined as the study of the interaction of man and environment; i.e., it would be that phase of animal ecology which is particularly concerned with the human species." Floyd Nelson House, *The Development of Sociology*, New York, 1936, p. 139. See also Floyd Nelson House, *The Range of Social Theory*, New York, 1929, Chapter 6, for a review of the historical antecedents of human ecology in plant ecology and human geography.

[10] Harlan H. Barrows, "Geography as Human Ecology," *Annals Assn. of Amer. Geogrs.*, Vol. 13, 1923, p. 4.

noted that the text by White and Renner—carrying the subtitle "An Introduction to Human Ecology"—was apparently quite widely used for a time.[11]

Summing up, I think that it is fair to make three observations:

(1) Geographers seem to have reached a high degree of consensus regarding the nature of their task, and the substance of their discipline.

(2) Despite this consensus, representatives of other disciplines—even the most interested outsiders—do not have a clear image of geography as it has developed in recent years. Their view of geography tends to be outmoded, representing the field as it existed at least a full generation earlier.

(3) The ecological viewpoint is not widely appreciated within geography at the present time; geography is not viewed "as" human ecology, nor is ecology regarded as a subfield within geography. If these observations are correct, it may be worth some effort to attempt a brief sketch of human ecology as it has developed within sociology and then to present one person's view of the logical contact points between the two disciplines.

THE NATURE OF HUMAN ECOLOGY

In any discussion of human ecology, it is important to recognize that this approach—like geography—has changed considerably in the course of its development. Human ecology is a relatively recent development; the first use of the term in the sociological literature was in 1921. (The first book bearing the title appeared in 1935, but it was by a botanist.)[12] In terms of age, the contrast with geography is quite clear. Yet in this brief span of time, ecology has evolved quite rapidly.

Ecology as the Study of Space

Despite this rapid evolution, most sociologists today regard the approach as dealing with spatial relations, very much along the lines suggested by McKenzie's 1931 definition: "Human ecology deals with the spatial aspects of the symbiotic relations of human beings and human institutions."[13] This view is clearly spelled out in Quinn's book (published in 1950) and it is the general conception underlying most discussions of the field in introductory textbooks in sociology. The "majority view" is quite well represented in Quinn's remarks: "To some sociologists human ecology includes all studies of spatial distributions of human phenomena. . . . These persons regard spatial distribution as the distinguishing feature of ecological study."[14] This suggests one possible link with geography; to many sociologists, in fact, human ecology is "merely geography."

In recent years, this spatial conception—associated with the names of Park and Burgess and, to a lesser extent, with those of their students, McKenzie and Quinn—has come to be labelled "classical" ecology, and a number of rather harsh criticisms have been levelled against it. Theodorson, cited above, is only one of a number of writers who have reviewed this critical literature; the arguments pro and con need not detain us here. Suffice it to say that contemporary ecologists themselves are not satisfied with the original formulation of the approach as the study of spatial relations.

[11] C. Langdon White and George T. Renner, *Geography: An Introduction to Human Ecology*, New York, 1936.

[12] J. W. Bews, *Human Ecology*, London, 1935.

[13] R. D. McKenzie, "Human Ecology," in *Encyclopaedia of the Social Sciences*, Vol. 5, 1931, p. 314.

[14] *Op. cit.*, p. 9.

Ecology as the Study of Organization

The clearest effort toward a redirection of ecological interests is represented in the work of Amos Hawley, a former student of both Quinn and McKenzie. Hawley first signalled his break with the "classical" approach in a 1944 essay in which he criticized the basic assumptions underlying the traditional conception of the field. Finally, in 1950, he published a full-scale treatise, in which he attempted to develop human ecology as a "theory of community structure."[15]

In a larger sense, Hawley's work may be seen as an effort to bring human ecology back into sociology, or at least to show how its central problems articulate with those of the parent discipline. The logic of his approach is to make ecology one of a variety of approaches to the study of social organization, and its implications have been developed in subsequent discussions. In a recent essay, I have attempted to show that human ecology shows a series of striking parallels with the French tradition of social morphology initiated by Durkheim and Halbwachs, a tradition devoted to the macroscopic study of social organization.[16] Gibbs and Martin have cogently presented the case for the development of ecological theory as the analysis "of man's organization for sustenance."[17] And in an essay that contrasts three modes of organizational analysis, Otis Dudley Duncan and I have tried to explicate the Hawleyan view, and to show its distinctive attack upon the core problems of sociology.[18] Without repeating the arguments advanced there, it may be worth while to sketch the analytical position of human ecology within the larger discipline of sociology.

THE PLACE OF HUMAN ECOLOGY IN SOCIOLOGY

We can start with the proposition that the study of social organization is the central focus of the entire sociological enterprise. In Rossi's words, "The proper study of sociology is social organization. On this perspective there is probably the greatest degree of agreement in our discipline."[19] But the logical status of the concept "organization" varies significantly according to its analytical position in the frame of reference that is employed. At risk of oversimplification, it can be said that aspects of organization—or, more generally, properties of whole populations—appear in two quite separate guises in sociological analysis: as either "causes" or "effects." Similarly, properties of individual organisms have these dual analytical positions. The logically possible frames of reference are four in number.

First of all, we may distinguish two general modes of analysis directed to the explanation of the behavior of the individual organism. The first of these lies outside the province of sociology itself, so that it requires only the most brief consideration.

Individual Psychology

For the most part, "individual psychology" largely seeks its explanations among properties of individual organisms *other* than that which is to be explained. Thus a psychologist setting

[15] Amos H. Hawley, "Ecology and Human Ecology," *Social Forces*, Vol. 22, 1944, pp. 398–405; *Human Ecology*, 1950, *op. cit.*

[16] Leo F. Schnore, "Social Morphology and Human Ecology," *Amer. Journ. of Soc.*, Vol. 63, 1958, pp. 620–634.

[17] Jack P. Gibbs and Walter T. Martin, "Toward a Theoretical System of Human Ecology," *Pacific Soc. Rev.*, Vol. 2, 1959, pp. 29–36.

[18] Otis Dudley Duncan and Leo F. Schnore, "Cultural, Behavioral, and Ecological Perspectives in the Study of Social Organization," *Amer. Journ. of Soc.*, Vol. 65, 1959, pp. 132–146.

[19] Peter H. Rossi, "Comment," *Amer. Journ. of Soc.*, Vol. 65, 1959, p. 146.

out to account for variations in learning or perception tends to confine himself to other properties of the organism in his search for causes. In other words, individual psychologists tend generally to predict from one property of an individual organism to another. If this effort is pursued self-consciously and consistently at the individual level of analysis, the result is a kind of biological or physiological inquiry; it seeks a universalistic explanation of a particular psychological process, an account that holds for all men everywhere, without respect to social position, group membership, allegiance to particular norms, etc.

Social Psychology

As soon as these last-named factors enter the analysis, however, the analyst leaves the domain of individual psychology *per se*—psychology unadorned by qualifying adjectives—and enters the realm of "social psychology." This view represents an attempt to move between two levels of analysis, with certain group properties (e.g., size) serving as explanatory factors, and certain individual properties (e.g., perceptions of group norms) taken as the phenomena to be explained. Much of the work in "small group" research is of this nature, although this mode of analysis is by no means confined to situations in which face-to-face interaction is possible.

In general, it may be said that any effort to explain individual behavior by reference to group membership or position makes use of a social-psychological hypothesis. Social psychology ignores what is common to all men (this is left to individual psychology) and what is unique to particular individuals (this is left to the biographer); it deals with what is common to *classes of individuals* in a particular culture, a particular stratum, a particular role. (This point sometimes leads to needless confusion. Some social psychologists firmly deny that they deal with "the individual." What they mean is that they are not concerned with the actions of particular, named individuals. However, the conduct of classes of individuals or "actors" is precisely central to their interests.)

Now the treatment of "social organization" is not inevitably the same in all social-psychological inquiries. The explanation ordinarily proceeds by predicting from population to individual properties. An example is Wirth's famous analysis of "urbanism as a way of life," in which he tried to account for individual behavior and outlook in the urban setting by reference to population size, density, and heterogeneity.[20] In addition to appearing as attributes of populations, however, certain aspects of social organization may be transmuted into individual properties for analytical purposes. Examples of social-psychological analysis strictly confined to the individual level are to be found in most of the work subsumed under "role analysis," and virtually all of contemporary research using sample survey methods. Here the individual's position in the social structure is essentially regarded as a *personal* attribute, analytically speaking, and it is employed to explain his behavior *vis-à-vis* other persons playing complementary roles, or in particular areas of conduct that are amenable to a sample survey approach, such as voting or fertility.

"Organization" has a different meaning in these various inquiries, sometimes appearing as the "social environment" which is perceived by the actor, sometimes as a set of normative constraints, sometimes as a congeries of cultural values. In all of them, however, the common stamp is an effort to explain

[20] Louis Wirth, "Urbanism as a Way of Life," *Amer. Journ. of Soc.*, Vol. 44, 1938, pp. 1–24.

individual behavior by reference to organizational attributes of populations or to the individual's position within the social structure. In summary, we may identify the major mode of social-psychological inquiry as a broad-scale research strategy that attempts to predict from some aspect of social organization to some class of individual behavior or conduct. Newcomb has specified "the characteristic point of view of social psychology" as follows:

> "We may say that social psychology deals with the association of variations in the behavior of one or more individuals with variations in social environment. . . . Secondly, differences in social environment and the way in which they are experienced are very largely determined by the way in which the individual's society is organized."[21]

Psychological Sociology

In contrast to "social psychology" is an approach that I prefer to call "psychological sociology." The positions of the adjective and the noun designate the so-called "independent" and "dependent" variables respectively; in other words psychological factors are viewed as having sociological effects. "Psychological sociology" subsumes all efforts to explain properties of populations by reference to the properties of the individuals who—from one point of view—may be said to make up these populations. Many examples are to be found in the literature on "culture and personality," at least in that phase of this work which attempts to account for such macroscopic features as forms of political organization in terms of individual experience with child-rearing practices, etc. In any event, most efforts to explain macroscopic social phenomena in terms of "basic personality structure" or "national character" make use of the underlying assumptions identified here as those of psychological sociology.

It is evident here that one's philosophical views concerning levels of "emergence" are crucial to the development of his position on these matters. Some writers assume that "only the individual is real," and that social structure is either a kind of convenient fiction or a shorthand designation for summarizing individual behavior in aggregative terms; such writers are inclined to the view here labelled "psychological sociology," although they eclectically adopt certain aspects of social-psychological thought as it suits their analytical needs. Others who assert that "social structure" represents something other than the simple sum of individual actions are much more likely to confine themselves to social psychology, as defined here, or else to adopt an ecological perspective.

Human Ecology

Ecology is one of the modes of analysis that may be best identified as "macro-sociological" and it has one feature in common with "psychological sociology" as defined here. Both approaches take organization, or some particular aspect of it, as the thing to be explained. Aside from this common interest in the same phenomenon, however, there are few other similarities. For one thing, the ecological mode of analysis remains at one level with respect to the variables it employs; it seeks its causal factors among other attributes of organized populations, such as their demographic, technological, and environmental features. Perhaps the best examples are to be found in the substantial literature devoted to detailing the organizational consequences of variations in population size.

There is another macro-sociological

[21] Theodore M. Newcomb, *Social Psychology*, New York, 1950, p. 25.

mode of analysis that can be identified, however, and it is one that ecologists are inclined to use from time to time. Here organization appears—not as something to be explained—but as one of the causal factors in the study. This is a broad type of analysis, within which more specific types can be identified, with their designation depending upon the subject matter under investigation. Within the ecological framework, effort can be directed to the explanation of technological, environmental, or demographic features. Moreover, just as different varieties of individual psychology are designated by subclassification according to the analytical purposes at hand (e.g., the various "psychologies" of perception, learning, memory, etc.) one can similarly identify "organizational ecology" and "population ecology."[22]

Now both of the "macro-sociological" approaches sketched here can be applied to populations of any size and degree of complexity; that is why I label them "macro-sociological" rather than "ecological." I am inclined to reserve the term "ecology" for efforts to understand the interconnections between variations in population, organization, environment, and technology in the context of such macroscopic units as communities and regions.

In summary, I have attempted to identify four more-or-less distinctive modes of analysis to be found in social science, one of which is the "macro-sociological." I have indicated some of the ways in which I see this mode as different from other major types of inquiry within sociology, and I have suggested that "human ecology" might be best regarded as a type of "macro-sociology." Its most distinctive feature can perhaps be seen in its adherence to a single level of analysis, in which properties of whole populations are at issue. Although other sociological approaches also focus upon social organization, the adherence to a consistent level of analysis makes the perspective of human ecology somewhat unusual in the analytical *armamentarium* of the discipline. At the same time, the very fact that social organization is given a central role in ecological studies places ecology within the sphere of activities in which sociologists claim distinctive competence, i.e., the analysis of social organization.

[22] Jack P. Gibbs and Walter T. Martin, "Urbanization and Natural Resources: A Study in Organizational Ecology," *Amer. Soc. Rev.*, Vol. 23, 1958, pp. 266–277; Thomas Park, "Population Ecology," *Encyclopaedia Britannica*, Chicago, 1957, Vol. 18, pp. 236–241.

CONTACT POINTS BETWEEN GEOGRAPHY AND HUMAN ECOLOGY

Now one may ask two questions: (1) What is the relationship between "classical" ecology—ecology as the study of spatial relations—and contemporary ecology as the study of social organization? (2) What is the relationship between contemporary ecology and geography?

First, it should be made quite clear that contemporary ecologists have not somehow abandoned all interest in spatial matters. A large portion of Hawley's book is given over to a consideration of spatial patterns; more important, the research conducted by people like Hawley, Duncan, and others of similar persuasion actually deals with spatial subjects—the redistribution of population in metropolitan areas, territorial differentiation, the physical segregation of racial and ethnic groups, etc. The key difference is that these matters are not objects of inquiry *for their own sake*. We have simply returned to the basic insight expressed by Robert E. Park many years ago, when he observed how

"social relations are so frequently and so inevitably correlated with spatial relations."[23] In other words, it is only to the extent that spatial patterns mirror or reflect patterns of social organization that they assume any real interest for contemporary ecologists.

As to the contact points between contemporary ecology and geography, I think that one can gain the best idea of their actual and potential linkages, and their tendency to overlap, by considering certain substantive topics of inquiry, for it is in the empirical problem areas that the two disciplines meet.

Economic Geography

The first area in which ecology joins (or even invades) geography is in the province of economic geography. A volume like that of Zimmermann's is a prime source for both geographers and ecologists, though written by an economist. Not only is there provided a detailed consideration of the spatial distribution of "resources," but there is also displayed a keen sensitivity to the ways in which technology and social organization literally intervene between population and the physical environment.[24]

More particularly, the area known as "the geography of economic development" shows even more striking parallels. I am thinking in particular of a recent essay by Berry, in a new volume in the Chicago series of research papers in geography.[25] Berry made use of masses of statistical data for countries and territories around the world in an effort to get at the "regionalization" of economic development; his method included the construction of a correlation matrix and a subsequent factor analysis. Although they are not typical of geographic or ecological methods, it happens that I have used precisely the same techniques—and essentially the same data—in a recent study of urbanization and economic development. Except for an emphasis upon the correlates of urbanization in my work, and a concern with the possible relevance of tropical versus temperate climate in Berry's study, these two independent efforts are practically identical in approach and in results, despite the different disciplinary identifications of their authors.

Urban Studies

Urban studies offer another area of contact and interpenetration. Even a brief perusal of the contents of the Mayer-Kohn reader in urban geography and the ecological section in the Hatt-Reiss reader in urban sociology will reveal markedly similar preoccupations.[26] At least one sociologist is represented in the Mayer-Kohn volume, and the Hatt-Reiss collection contains contributions by such eminent geographers as Chauncy Harris, Edward Ullman, and Robert Dickinson.

The links here are not too hard to explain. For one thing, the departments of sociology and geography at the same institution—the University of Chicago—were the birthplaces of these two specialties. One may assume that some intellectual interchange took place

[23] Robert E. Park, "The Concept of Position in Sociology," *Publications of the American Sociological Society*, Vol. 20, 1925, p. 14.

[24] Erich W. Zimmermann, *World Resources and Industries*, rev. ed., New York, 1951. The same thing may be said of the contributions by geographers and geographically oriented economists to William L. Thomas, Jr. (edit.), *Man's Role in Changing Face of the Earth*, Chicago, 1956.

[25] Brian J. L. Berry, "An Inductive Approach to the Regionalization of Economic Development," in Norton Ginsburg (edit.), *Essays on Geography and Economic Development*, Department of Geography, University of Chicago, 1960, pp. 78–107.

[26] Harold M. Mayer and Clyde F. Kohn (edits.), *Readings in Urban Geography*, Chicago, 1959; Paul K. Hatt and Albert J. Reiss, Jr. (edits.), *Cities and Society: The Revised Reader in Urban Sociology*, Glencoe, Ill., 1957.

from the very beginning. Still there is a difference between the two disciplines in their approach to the city. Ginsburg has summed it up very nicely in the following passage:

> "The distinction between urban geography and urban sociology never has been clear, especially with regard to studies of the internal organization of cities. Their zone of overlap is sometimes defined as urban ecology, although each field has its distinctive emphasis. The urban sociologist tends to concentrate on problems centering about the areal relations between social group and social group. The urban geographer emphasizes problems concerning the interrelations between micro-region and micro-region, on whatever basis they may be defined."[27]

Human ecologists interested in patterns of community organization have also learned a great deal from geographer's efforts in classifying cities along functional lines, and from empirical efforts aimed at establishing the urban "economic base."[28] Some of these studies are as structural in emphasis as anything in the ecological literature.

Population Studies

One last area that must be mentioned is that of population studies. In his presidential address before the American Association of Geographers in 1953, Trewartha cogently outlined "A Case for Population Geography." Consider this brief passage:

> "In our science, the central theme of which is area differentiation, the dynamic and pivotal element is human life, or population. This is not to claim that people should be directly the object of study to a greater extent than climate, systems of land use, transportation patterns, etc., but rather to suggest that fundamentally geography is anthropocentric and, if such is the case, that numbers, densities, and qualities of the population provide the essential background for all geography. *Population is the point of reference from which all the other elements are observed and from which they all, singly and collectively, derive significance and meaning. It is population which furnishes the focus.*"[29]

Now hold alongside it Hawley's observation, expressed in the 1944 essay to which I referred earlier: "The problems of human ecology, and ecology in general, are basically population problems."[30] In his book, Hawley devotes all of one of the four major sections to demographic phenomena. More recently, Duncan has provided a lucid and comprehensive review of the central place of population in the ecological approach.[31] Here is another substantive area in which the empirical interests of the two fields join, and—in some instances—become indistinguishable.

CONCLUSIONS

I cannot conclude this brief sketch without pointing out and underscoring

[27] Ginsburg, "Geography," *op. cit.*, p. 83.

[28] Chauncy D. Harris, "A Functional Classification of Cities in the United States," *Geogr. Rev.*, Volume 33, 1943, pp. 86–99; Chauncy D. Harris, "Suburbs," *Amer. Journ. of Soc.*, Vol. 49, 1943, pp. 1–13; Howard J. Nelson, "A Service Classification of American Cities," *Econ. Geog.*, Vol. 31, 1955, pp. 189–210; Gunnar Alexandersson, *The Industrial Structure of American Cities: A Geographic Study of Urban Economy in the United States*, Lincoln, 1956; John W. Alexander, "The Basic-Nonbasic Concept of Urban Economic Functions," *Econ. Geog.*, Vol. 30, 1954, pp. 246–261; and three studies published by the School of Commerce, University of Wisconsin: John W. Alexander, *Oshkosh, Wisconsin: An Economic Base Study*, 1951; Richard L. Brown, *An Economic Base Study, Racine, Wisconsin*, 1951; and John W. Alexander, *An Economic Base Study of Madison, Wisconsin*, 1953.

[29] Glenn T. Trewartha, "A Case for Population Geography," *Annals of Assn. Amer. Geogrs.*, Vol. 43, 1953, p. 83. See also Edward A. Ackerman, "Geography and Demography," in Philip M. Hauser and Otis Dudley Duncan (edits.), *The Study of Population*, Chicago, 1959, pp. 717–727.

[30] Hawley, "Ecology and Human Ecology," *op. cit.*, p. 404. See also Hawley, *Human Ecology, op. cit.*, Part II, *passim*.

[31] Otis Dudley Duncan, "Human Ecology and Population Studies," in Hauser and Duncan, *op. cit.*, pp. 678–716.

the essential difference that remains between geography on the one hand and ecology on the other. And here I believe that the historical contrast is most enlightening, for as geographers have come to realize that the core of their interest is the study of *areal or spatial differentiation*, ecologists have simultaneously turned away from a concern with spatial patterns *per se*, except as they enlighten us with respect to *social organization*. This is indeed a hopeful sign, for a more self-conscious delineation of one's field is of enormous help in the critical stage of stating problems for research. Our boundaries do touch, but there is ample room for "peaceful coexistence." If I may conclude by quoting a non-geographer, non-ecologist, I would remind you that "good fences make good neighbors," and I hope that these remarks will help both sides to maintain communications across our common frontier.

LOCATIONAL PATTERNS OF AMERICAN AUTOMOBILE ASSEMBLY PLANTS, 1895–1958

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THE study of industrial location is a topic of increasing importance and interest in the field of economic geography. Basic to the investigation of the locational characteristics of any industry is an examination of the geographic pattern of that industry. Too often, the locational patterns of the past are not given adequate presentation. Examination of changes in locational patterns over a period of time may reveal much about the locational factors affecting an industry. The data presented herein is an attempt to trace the changing locational patterns of the United States passenger automobile-assembly industry over a period of 63 years. The major purpose of this study is to introduce information not previously considered in geographic studies of the automobile industry.

The manufacture of passenger automobiles has been a major segment of the American industrial scene for more than half a century. Few other industries are so closely identified with a single geographic location. The press and public alike consider the city of Detroit to be synonymous with the manufacture, design, and financing of passenger automobiles. While this concept has a degree of validity today, it has not necessarily applied throughout the history of the automobile industry. Passenger automobiles were manufactured in many cities. Several of the larger industrial complexes of the United States have challenged the supremacy of Detroit as the center of the automobile industry. Studies dealing with this industry, geographic or otherwise, have tended to overlook the importance of the total number of automobile manufacturing firms and their widely scattered locational patterns.

Criteria for Selection of Data

In order properly to assess the relative importance of the various centers of automobile manufacturing, many kinds of data would be required. The basic problem is that of determining the number of companies which entered into the manufacture of passenger automobiles during the period 1895 to 1958. Even the most authoritative sources of information on the automobile industry do not agree as to the total number of companies which operated in the United States. There is remarkably little information readily available on the location of the manufacturing facilities of these companies or the years in which the companies were in operation. The best sources of information are the trade journals of the industry which first appeared during the decade 1890–1900.[1]

[1] The following is a list of the principal serial publications from which data was compiled for use in this study: *Automobile Topics*, Motor Trades Publishing Company, New York, 1900–1948; *Cycle and Automobile Trade Journal*, Chilton Company, Philadelphia, 1896–1935; *Horseless Age*, Horseless Age Company, New

(*Continued on next page*)

Data compiled from these sources indicates that there were more than 3000 firms organized for the manufacture of passenger automobiles in the United States. It is probable that many of these firms never entered into production or else did not produce a significant number of vehicles. As continued research constantly uncovers data on previously unknown operations, this study does not deal with the total number of automobile-assembly plants which have operated in the United States. The material presented is based upon a selected group of firms known to have achieved production of passenger automobiles. Excluded from this study are firms which manufactured only trucks, commercial vehicles, tractors, and taxicabs. Included are passenger automobile-assembly plants in which three or more vehicles were produced in any given year, prior to 1914.

In the period following 1914, only those plants which produced 12 or more vehicles in any given year are included.[2] It is necessary to change the criteria for inclusion of data at this year because of basic changes in the economics of the automobile industry. Nineteen hundred and fourteen marked the close of the period of experimentation and the widespread entry of small manufacturers. Prior to this date, the production of three or more vehicles indicates that the plant or company was at least beyond the stage of rank experiment. In effect, the figure of three vehicles per year has been selected to eliminate a rather considerable number of "one of a kind" and purely experimental vehicles which were constructed. Such vehicles rarely indicated an attempt to manufacture for general sale. The data does not include any form of automobile manufacture other than final assembly plants. It is evident that prior to 1914 a small machine shop, boatyard, or wagon works might have become an automobile-assembly plant, as was often the case. After 1914, it was increasingly difficult for the smaller manufacturer to compete with the larger companies.

LOCI OF AUTOMOBILE-ASSEMBLY PLANTS

Under the criteria set forth above, this study includes data on 2683 passenger automobile-assembly plants which operated for varying lengths of time during the period 1895–1958. Of these plants, 71 were branch operations of one of the larger companies. Thus, the study deals with 2612 separate companies. The plants were located in 664 different places in 46 states. No data has been found which indicates that automobile manufacture ever took place in Arizona, Montana, Hawaii, or Alaska. These 664 locations are plotted on the map shown in Figure 1. This map presents the distribution of passenger automobile assembly during the 63 year period under study. Each dot represents a place where a passenger automobile-assembly plant, or plants, was located.[3] From this map, it is evident that the manufacture of passenger automobiles was not confined to Detroit or southeast Michigan.

The patterns of plant location shown in Figure 1 reflect the American manufacturing belt. There are significant concentrations in the northeast, such as the eastern Massachusetts region and

York, 1895–1918; *Motor*, International Magazine Company, New York, 1899—; *Motor Age*, Class Journal Company, Chicago, 1899–1928; *Motor Vehicle Review*, Emil Grossman and Brothers, Cleveland, 1899–1901; *Motor World*, Motor World Publishing Company, New York, 1900–1925; *The Automobile*, Class Journal Company, New York, 1899–1918.

[2] Statistics on actual production are difficult to obtain for many of the smaller companies. Although the selection of companies for inclusion in this study was carefully checked, there may be errors for which the author accepts responsibility.

[3] On Figure 1, places which have been incorporated with larger cities since the time of automobile-assembly operations are not shown separately.

FIG. 1.

the northern New Jersey region. The concentration of centers of automobile manufacturing in these areas is perhaps larger than has previously been supposed. The cities of the Hudson–Mohawk Valley and the Connecticut River Valley, and the industrialized towns of southeastern Pennsylvania are also easily identified on Figure 1. The pattern of manufacture in Ohio, Indiana, and Illinois is quite widespread, whereas in Michigan the concentration of manufacturing centers is in the southern portion of the State. Of interest are the widely scattered centers of the western plains and grain belt and the relative absence of manufacturing centers in the southeast. On the west coast, two areas of manufacturing activity are prominent: the concentrations around San Francisco Bay and Los Angeles. The over-all pattern poses several significant questions. If automobiles were manufactured at so many widely scattered locations, why has Detroit come to be the center of the automobile industry? How many of these locations are the site of an automobile-assembly plant at the present time? Did any of these concentrations of activity ever challenge the supremacy of Detroit in total number of operating plants? And, finally, why has the industry disappeared from so many locations throughout the country?

Not all of these manufacturing operations were of equal importance. Three hundred and fifty-five of the locations under consideration were the site of only one operation; 46 locations were the site of ten or more assembly plant operations. The latter may be considered as the more important centers of production. The relative importance of the various locations is difficult to evaluate without data on employment, production, and company earnings. For such a large number of companies, it is virtually impossible to secure this kind of data. In the interest of calling atten-

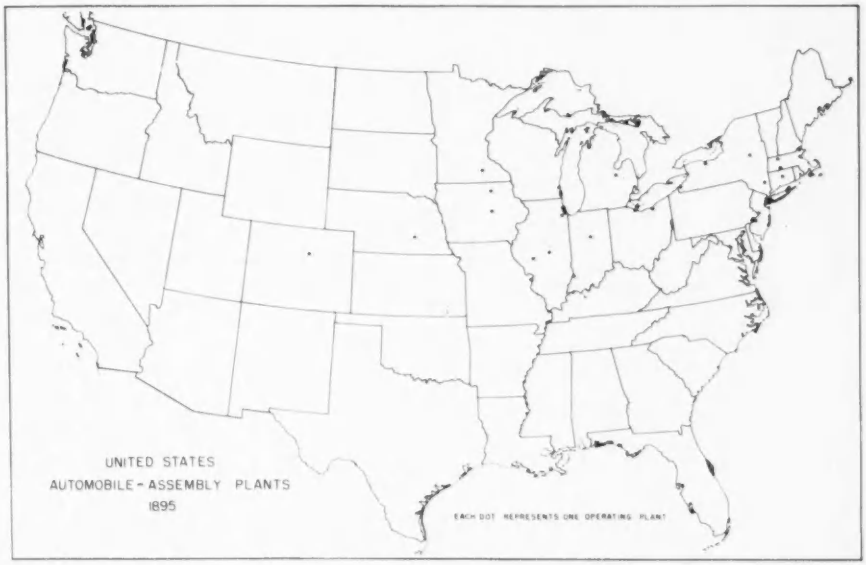

FIG. 2.

tion to the once widespread nature of the industry, the locational patterns shown in the series of maps accompanying this study have been based on relatively limited data. These maps show the number of companies operating during selected periods at each location. The city with the largest number of operations was not necessarily the most important center of automobile production at any given period. The maps do, however, suggest that certain cities not usually associated with the automobile industry were active in the manufacture of passenger automobiles. The distribution of manufacturing activities is shown for years which were selected as being significant or pivotal for the industry. The year 1895 was chosen as the base year. It was during the latter part of this year, and the following year, that the Duryea Brothers first produced more than one automobile of a given design. Their production in 1896 totaled 12 vehicles at their plant in Springfield, Massachusetts, the first attempt at quantity production of passenger automobiles by an American industrial firm.

GEOGRAPHIC DISTRIBUTION: 1895–1913

Figure 2 shows the location of automobile-assembly plants in 1895. A total of 40 plants operated during that year, and their dispersed pattern indicates the still experimental nature of the industry. The only concentration of significance was the grouping of seven plants in the vicinity of New York City. Of interest is the absence of plants in the city of Detroit. The map indicates that the development of passenger automobile manufacture was not confined to a single location, but rather was evolving in a number of widely scattered places.

Figure 3, automobile-assembly plants and their location in 1900, illustrates the rapid growth of the industry during the five-year period 1895–1900. A total of 327 plants are located on Figure 3

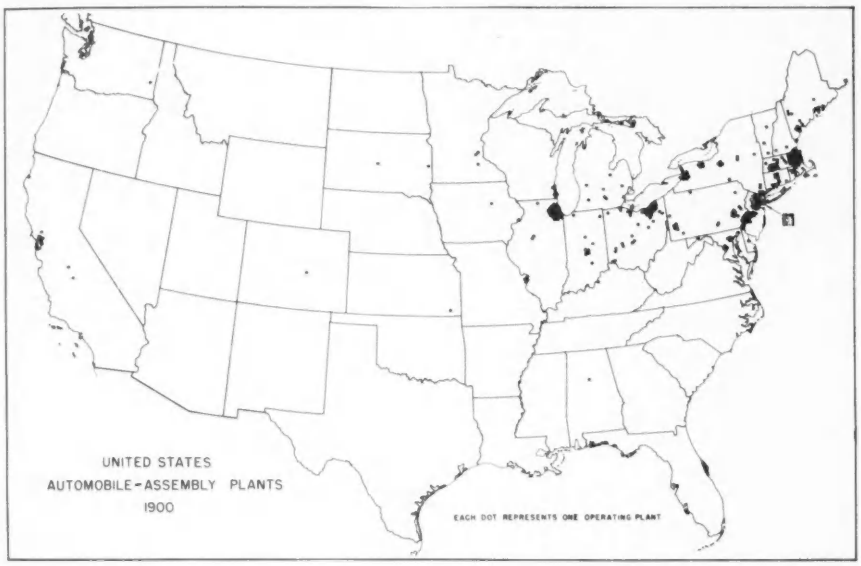

FIG. 3.

with a surprisingly great degree of concentration in southern New England and the middle Atlantic coastal region. Approximately half of the plants in eastern Massachusetts were located in small towns on the periphery of Boston. Springfield, Massachusetts, and the towns of the Connecticut River Valley were important centers for automobile production in this year. The concentration of plants in New York City, northern New Jersey, and the Philadelphia area indicate that the industry had exceptionally strong roots in the manufacturing centers of the east. In the midwest, the city of Detroit had but one plant; in contrast there were 21 plants in Cleveland and 26 in Chicago. More plants operated in out-state Michigan than in the city of Detroit. On the west coast, the concentration of plants in the vicinity of San Francisco tends to lend further credence to the concept that during the early years of the automobile industry no one city had a particular locational advantage over another. In the year 1900, more than half of all automobile-assembly plants were located on the northeastern seaboard of the United States.

A marked shift of manufacturing activity to the Great Lakes States had occurred by 1905 (Fig. 4). Boston, New York, northern New Jersey, Philadelphia, and the upstate New York cities continued to be major centers of automobile manufacture. In the city of New York, 35 plants operated during that year. However, Chicago, Cleveland, Detroit, Milwaukee, and St. Louis had become increasingly important. The rapid growth of the industry in Detroit is particularly notable. Indicative of the changing nature of the industry at this time is the virtual disappearance of the concentration of assembly plants at San Francisco. In all, 390 plants operated during the year 1905.

The map of assembly plants for 1909,

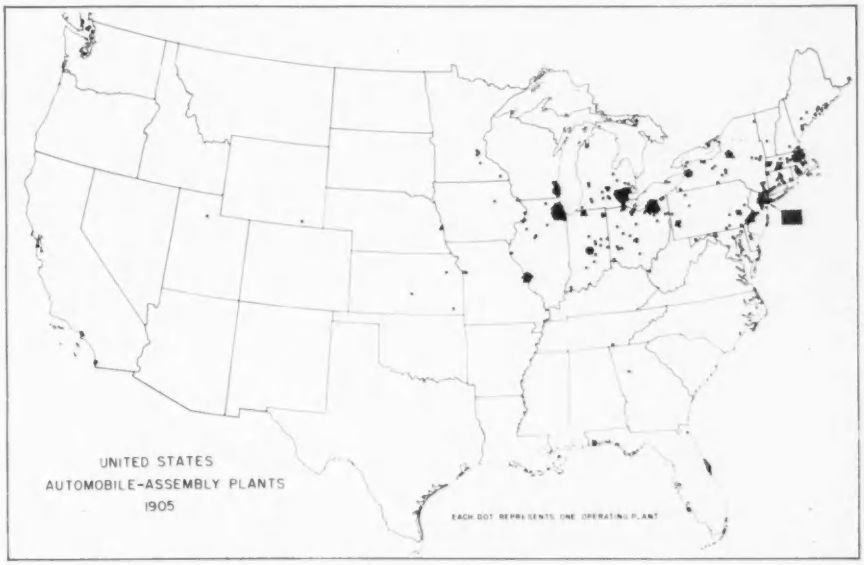

FIG. 4.

Figure 5, indicates that the center of automobile manufacturing activity had shifted to the midwest. The peak years of operation in Ohio, Indiana, and Illinois occurred between 1908 and 1911. There was a marked decline in the total number of assembly plants in the Atlantic Seaboard area, although the northern New Jersey–New York City complex continued as a principal center of manufacturing activity. The two greatest centers of automobile manufacturing operations in this year were Chicago and Detroit, each the site of 35 plants. In New York City and Cleveland, 23 plants operated. In all, 461 plants operated during the year 1909, a total exceeded only in 1914.

GEOGRAPHIC DISTRIBUTION: 1914, THE PIVOTAL YEAR

Perhaps the most important year in the history of the passenger automobile industry was 1914 (Fig. 6), the peak operational year for the industry: 469 plants entered into production. A total of 50 assembly plants established the supremacy of the city of Detroit. Although, New York and Boston had an increase in the number of plants over 1909, the most active centers of automobile production were in the midwest. Indianapolis, Cleveland, and Milwaukee became secondary to the concentration at Detroit and Chicago. Several Michigan cities, notably Flint, Saginaw, and Jackson, had concentrations of considerable activity. On the west coast, the first sizable concentrations of plants appeared in the vicinity of Los Angeles, while scattered companies continued operating throughout the plains states and the southeast. Nineteen hundred fourteen was not only a peak year for the industry, but also for the industry within the state of Michigan and the city of Detroit.

A combination of factors which affected the basic operations and marketing structure of the industry made

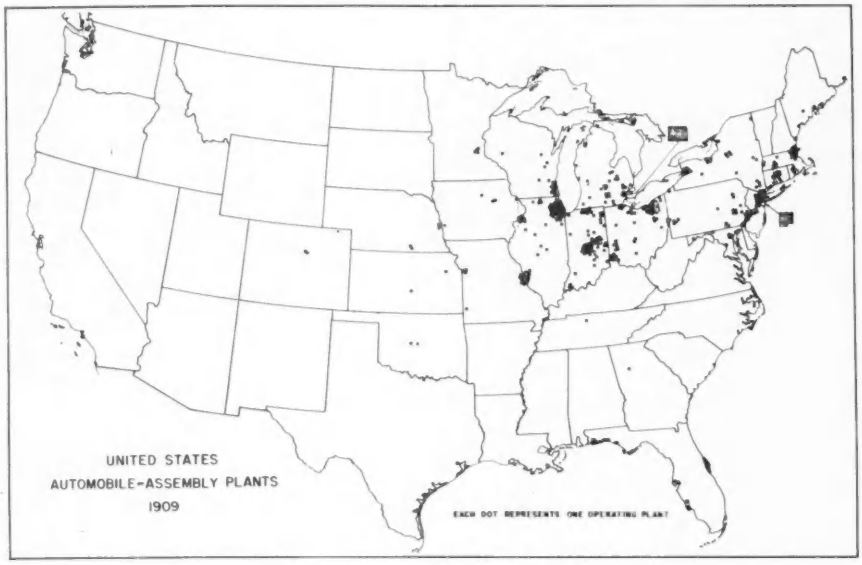

FIG. 5.

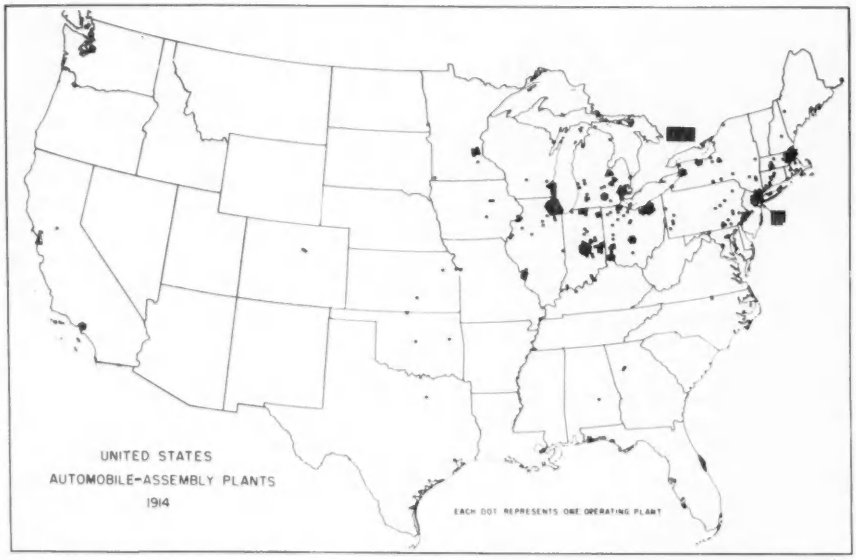

FIG. 6.

1914 a turning point for the manufacture of passenger automobiles. After this year there was a steady exit of smaller manufacturing firms from the industry. The changing nature of markets, influenced by the war in Europe,

caused many firms to enter into truck production or the production of war material. Many of these firms did not return to auto manufacturing at the close of the war. Nineteen hundred fourteen was the year in which a practical moving assembly line was perfected by the Ford Motor Company. Together with the minimum basic wage offered by that company, as well as the nationwide parts and service organizations of the larger firms, the moving assembly line ended the day of large-scale entry of smaller automobile manufacturers.[4]

GEOGRAPHIC DISTRIBUTION: 1915–1958

At the close of World War I, the total number of automobile manufacturing companies had declined to less than half of the number of companies operating in 1914. Figure 7 shows the distribution of automobile-assembly plants in 1919. There is little change in the geographic pattern of plant location, but a marked decline in the number of plants from the high of 469 in 1914 to a total of 234 in 1919. On the eastern seaboard, the only significant concentration was in the New York metropolitan area. Concentrations of activity continued in the Midwest at the long established centers —Detroit, Chicago, and Cleveland. Data for the years between 1914 and 1919 indicates that the decline in the number of plants was quite steady; there was no particular year of mass exit of firms. The map for 1919 reflects the postwar depression and the re-gearing of industry to consumer production.

A wave of optimism surged through the automobile industry in 1921. Encouraged by a more favorable economy, the entry of a large number of firms in this year is reflected in Figure 8. Of

[4] For a description of the development of moving assembly line production and the role of the Ford Motor Company see Chapters 8 through 11 of Denison and Merrill, *The Power to Go*, Garden City, Doubleday and Company, Inc., New York, 1956.

FIG. 7.

FIG. 8.

particular interest is the concentration of activity in Boston and the continued activity in New York City. In addition to the larger midwestern manufacturing centers, the presence of concentrations at St. Louis and Indianapolis indicate that the industry was not as yet tied to Detroit's apron strings. Two hundred and ninety-two plants operated during 1921. It was the last year of sizable concentrations of automobile-assembly plants in many parts of the country. Following the model years 1921–1922, the automobile industry began to decline in total number of companies engaged and plants in operation. The decline was most rapid in 1923, 1924, and 1925. In part, this resulted from the exit of companies that had first entered production in 1921. The industry was becoming more competitive, and in the face of an expanding economy, the larger firms began consolidation efforts, thus absorbing many of the marginal producers. By 1926, the industry had been reduced to a total of 182 assembly plants. This is in marked contrast to the 292 plants that were operating in 1921.

Figure 9 shows the distribution of plants for the year 1926. Several of the larger centers of automobile manufacture have all but disappeared from the map. Operations in New York City were reduced to two plants and in Chicago, only three plants remained. Detroit, Cleveland, Indianapolis, and St. Louis were the centers of the industry. Scattered throughout the western states and the southern states were many locations which were branch assembly plants of General Motors or the Ford Company. By 1926 the supremacy of southern Michigan as the center of automobile production was assured, and a trend towards decentralization, in the form of assembly plants, had begun.

From 1926 until 1934, the consolidation of companies and exit of smaller

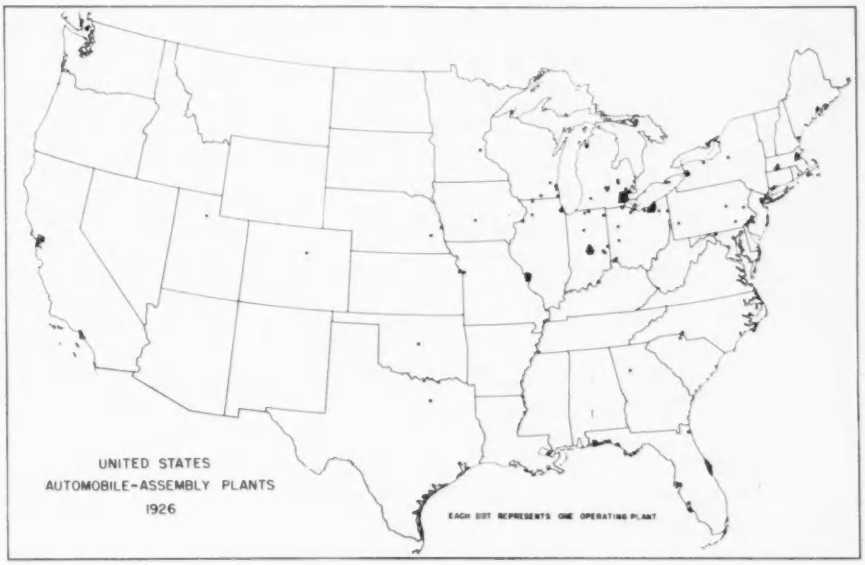

FIG. 9.

firms continued to characterize the automobile industry. The depression of the early 1930's hastened the exit of many of the smaller companies. In 1934, a total of 53 plants were in operation, 16 of these in Michigan (Fig. 10). After this year, the automobile industry was very nearly stabilized in the total number of operating plants and, to a great degree, their geographic distribution. The map of automobile-assembly plants for 1958 shows little change over a 24 year period (Fig. 11).

In 1958 a total of 54 plants were in operation, less than a third located in the state of Michigan. In that same year Michigan produced approximately one-third of the total automobile output of the United States. The 1958 map reflects the operations of five major companies and their branch plants, as well as a number of custom building plants whose output was limited but which properly fall within the scope of this study. The principal concentrations of custom building plants were in Los Angeles and Detroit.

MAJOR TRENDS IN THE LOCATION OF AUTOMOBILE-ASSEMBLY PLANTS

The shift of manufacturing activity in the automobile industry from the east coast to the midwest emerges as the major trend in the locational patterns illustrated by the series of maps. Particularly affected by this shift were the cities of Boston, Philadelphia, and New York, where peak years of automobile manufacturing activity occurred between 1900 and 1905. From the east coast cities, the centers of manufacturing shifted to the midwestern industrial centers at Chicago, Cleveland, St. Louis, and Cincinnati. These cities experienced their peak years from 1909 through 1911. The peak year of operation in Indianapolis and Detroit was 1914. The east coast cities were not the only locations, however, to decline

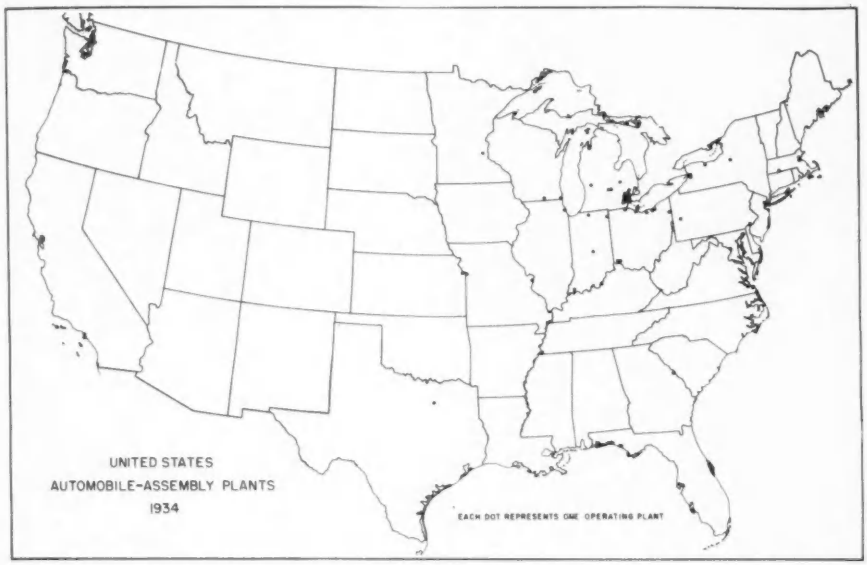

FIG. 10.

FIG. 11.

in importance in the automobile industry. The centers at Chicago, Cleveland, and other midwestern cities also declined or disappeared. These changes in the centers of automobile-assembly suggest two related questions. Why

have once-active centers of automobile manufacturing operation lost that function? And what locational advantages, if any, does the city of Detroit possess that might warrant the concentration of manufacturing activity there? The question of "why Detroit" has been analyzed by many writers.[5] The data presented on these maps suggest that of equal importance is the question, why not Chicago, Cleveland, or New York City?

Perhaps the most significant result of the plotting of this data lies in the recognition of automobile manufacturing activity in cities and areas not usually associated with this industry. Although it is not possible to rank the centers of automobile manufacture as to their importance simply on the basis of the total number of plants assembling automobiles in any given year, such data do indicate interest and investment in the automobile manufacturing industry.

[5] *Ibid.*, Chapter 4 of this work is an example of an attempt to answer this intriguing question.

PRIMATE CENTERS OF AUTOMOBILE-ASSEMBLY

Figure 12 is a map of the total number of plants entering into operation at each city in which ten or more plants operated during the period of record; 46 centers of manufacturing activity are shown. The cities of Detroit, Chicago, New York, and Cleveland, each the site of more than 100 automobile manufacturing operations, appear as the most important centers of the industry. In terms of total number of plants, Detroit was the most active of the 46 centers but the total for Detroit, 190, is very little more than the totals for New York City, 177, and Chicago, 172. On the basis of total number of assembly plants these three cities were the leading competitors for the distinction of becoming the automobile center of the United States. The next largest center, Cleve-

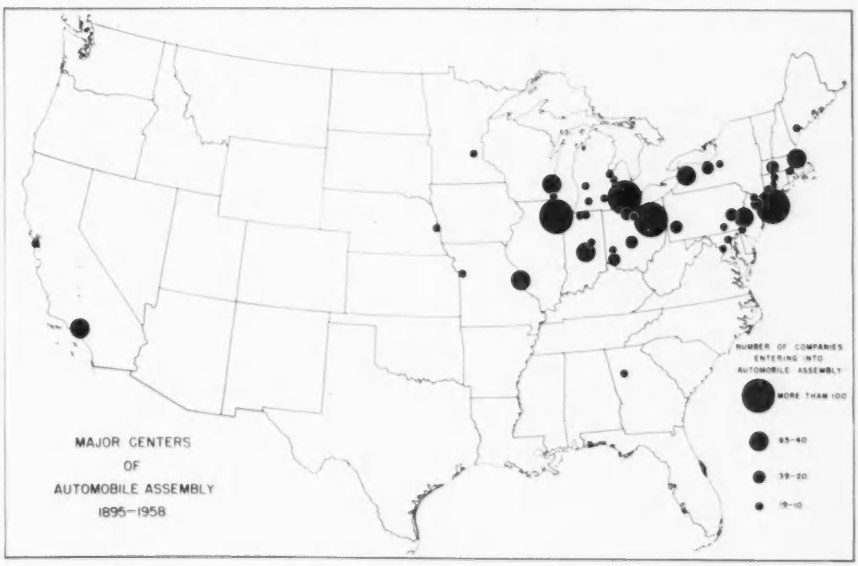

FIG. 12.

land, was the site of 102 plants; no other center exceeded a total of 65. The pattern created by the plotting of these 46 centers shows a close adherence to the American manufacturing belt and to major population centers. Perhaps the most important idea suggested by this map is that of the importance of the automobile industry in 46 cities, as opposed to the commonly held concept that automobile manufacture has been important only in Michigan and specifically in Detroit. The automobile industry was a major segment of the economy in 46 cities of which two, Detroit and Los Angeles, are centers today.

The importance of these 46 concentrations of automobile-assembly operations should not detract from the fact that automobiles were manufactured in many other cities besides these major centers. The failure of a single automobile plant in Carthage, Missouri, may have had a more profound effect on the economy and history of that town than did the exit of 177 firms in New York City. There were 355 places in which only one automobile-assembly plant operated and a majority of these operations were locally inspired and financed. The problem of why automobiles were manufactured at any of the 664 locations and why any particular company failed requires further research.

This study is intended as a presentation of basic data. Many problems and questions are posed beyond the scope of the research undertaken. Two problems, however, would seem to call for geographic investigation and additional research. Primarily, there is a need to study the industrial evolution of the automobile industry in the 46 major centers of manufacture. A second problem closely related to this would be the determination of the extent to which the automobile industry left a residual in the cities that were once centers of automobile manufacture. Such residual industry is known to exist in many former centers of automobile manufacture in the form of automotive parts and equipment manufacturers.

CONCLUSIONS

Two conclusions may be drawn from the data presented herein. The automobile-assembly industry has been a major factor in the economy of a sizable number of United States manufacturing centers. During the early years of the industry, assembly operations were widely scattered and were not limited to the large, long-established manufacturing centers. The maps indicate that changes in the locational patterns of the passenger automobile-assembly industry have had a more profound effect on many more people and places than has previously been recognized in the field of manufacturing geography.

ACKNOWLEDGMENTS

The author is indebted to Mr. Stanley K. Yost of Royal Oak, Michigan, for his assistance in the compilation and verification of the historical data on which this study is based.

DIVERSIFICATION OF THE ECONOMY OF THE CACAO COAST OF BAHIA, BRAZIL*

Rayfred L. Stevens and Paulo Rebouças Brandão

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THE Cacao Coast of Bahia has long suffered from dependence on the erratic market for its main crop. Lately the inhabitants are becoming increasingly aware of the disadvantages of monoculture, and fortunately many of them are acquiring the ambition, the economic means, and the skills with which to develop other resources.

To observe and appraise these current trends and the resource potentials for developing a more diversified economy, the authors were commissioned by the Bahia Institute of Economics and Finance to make a reconnaissance of the Cacao Coast in December, 1957, and January, 1958. The study was to concentrate not only on the cacao producing lands but also on those adjacent areas which by economic function or simple juxtaposition are encompassed by a regional economy dominated by cacao. The area thus delimited involves a group of contiguous administrative units which together produce about 95 per cent of the cacao crop of Bahia, some 90 per cent of that of Brazil, and normally from 15 to 20 per cent of world production.

The big landowners (*fazendeiros*) of the Cacao Coast, whether absentees or residents, traditionally had little interest in diversified farms; instead they diversified their personal economies by investing in different types of farms and enterprises, many of them outside the area. Most of the cacao plantations (*fazendas*) were managed by overseers with a minimum of supervision from the owners.

Fortunately, however, there has been a gradual increase of resident landowners who have a growing concern for the land and its problems, and who personally take part in the direction of their operations. Both natives and newcomers—many of them from the *Sertão*—are included in this new class of entrepreneurs. These people have the means to live comfortably while residing near their investments, but, unlike the older, established *fazendeiros*, most of them cannot afford to maintain separate establishments in Salvador, Rio de Janeiro, or São Paulo.

Among the progressive entrepreneurs it is generally agreed that the region's

*The term "Cacao Coast" is used in preference to the designation "Cacao Zone" (*Zona Cacaueira*), variously accepted and perpetuated with some confusion by the Conselho Nacional Geografia in its delimitation of more or less the same area as one of the "physiographic zones" of Bahia. While neither the noun "*zona*" nor the adjective "*cacaueira*" identifies a particular place nor a physiographic trait, the name "Cacao Coast" suggests at once two most distinctive features of the physiography and the economy of the area under study.

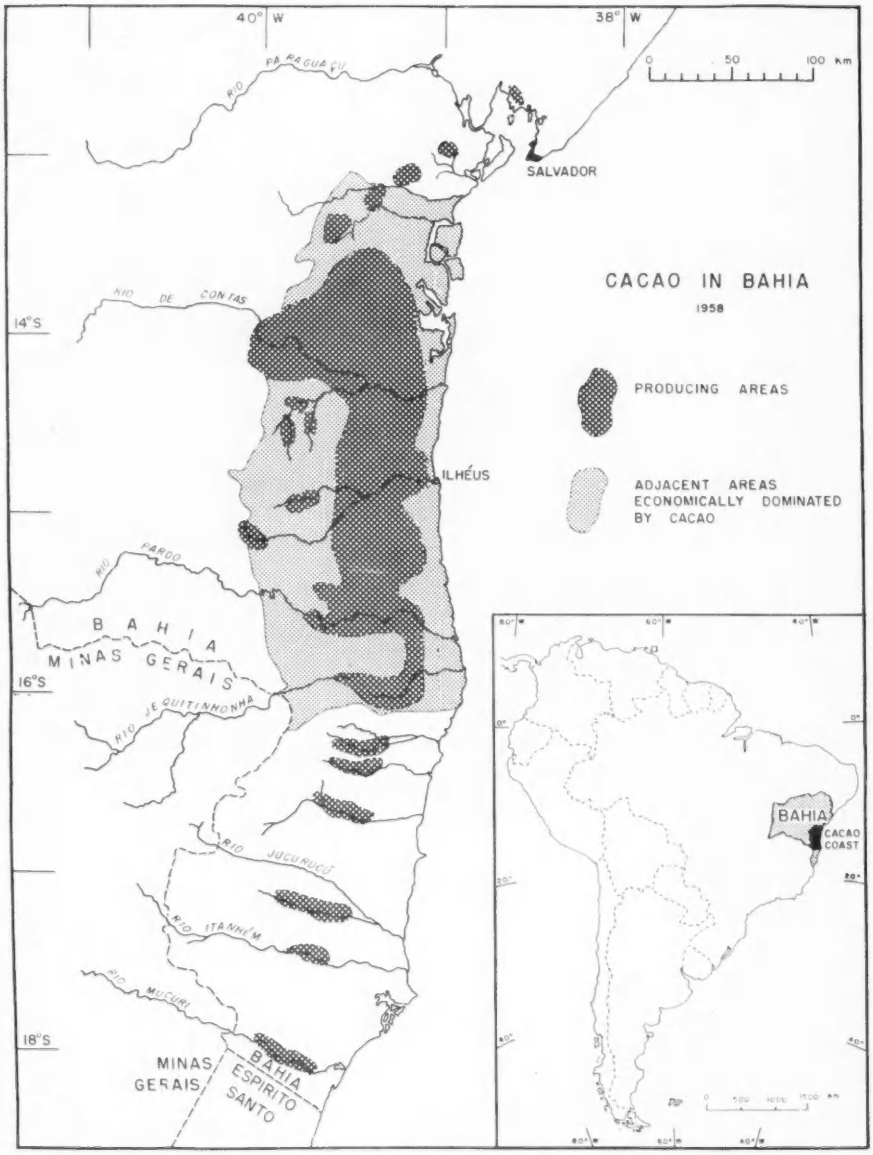

FIG. 1. The Cacao Coast, as an economic-geographic region, is understood to include not only cacao producing lands but also adjacent areas which, because of complimentary activities or simple isolation from other parts of Bahia State, are integrated into the same regional economy. For a similar reason, the small isolated areas of cacao production to the far north and south of the map are not to be included in the term "Cacao Coast," for they are integrated with other regional economies in which cacao is not dominant.

development faces three urgent material problems: (1) excessive dependence on cacao; (2) lack of adequate transportation facilities; (3) lack of abundant and reliable electrical energy. The progress and prospects in confronting these problems will be given due consideration in this review of the actual and potential diversification of the economy of the Cacao Coast.

THE DIVERSIFICATION OF AGRICULTURE

The products of the soil must long continue to be the mainstay of the economy of the Cacao Coast, in spite of the prosperous beginnings of industrialization. Since cacao can be expected to remain the chief source of pecuniary exchange for financing the development of the region, a prominent place should appropriately be reserved for it in a diversified land-use program.

It is useful from the outset to recognize three types of diversification: (1) diversification of the overall output of the area; (2) diversification by individual entrepreneurs owning several plots of land more or less widely separated, with each plot specializing in a particular product; and (3) diversification of individual operations—which is most lacking along the Cacao Coast. The last of these types deserves the utmost attention, for achieving it would automatically provide the advantages of the first two types of diversification and also bring a greater economic security to the rural populace.

To recommend and carry out a diversified program on an individual farm is easier in those parts of the area where the soil catenae—or topographic sequences—present a variety of phases that can each be dedicated to the crops for which it is best adapted. It is also easy to diversify in areas of uniform soils where two or more crops are known to return more or less equal rewards for similar amounts of land or labor. The problem is difficult where the land is so productive for a particular crop that, even in years of poor yield and low prices, its return is greater than that of any other crop which might be grown on the same plot. In the case of annuals, diversification might result automatically from the rotation of crops as a conservation measure applied for the express purpose of increasing the long-run yield of the major crop. Such is not the case with regard to long-lived perennials like cacao, which requires five to ten years to reach the commercial production stage wherein it may remain for another 20, 50, or even 100 years. In many parts of the Cacao Coast the soil is so appropriate for cacao that it seems ill-advised to replace it with other crops. Not only is it difficult to find another crop that will return as much as cacao, hour per hour, hectare per hectare, but also geographers may recall that the world has rather limited areas where soil and climate combine to afford truly ideal conditions for this useful crop. Therefore, the planner's attention should focus particularly on the lands unsuitable or marginal for cacao, to examine what is being done and what could be done with them in order to provide more stable economic conditions by means of a more diversified productive effort.

In reviewing current land use practices and in making recommendations for a more diversified program, it is convenient to distinguish three types of land according to suitability for cacao: (1) well-suited lands; (2) marginal lands; and (3) lands totally unfit for cacao (Fig. 2). Transition zones are mostly classed with the second group, which may include some spots where ideal soils lie next to others partly or entirely unsuitable in such a mosaic manner

that the vicinity must be classed as marginal.

Lands Well Suited for Cacao

Most of the lands well suited for cacao lie in a block at the foot of the Brazilian massif and are bordered on the east by the South Atlantic Ocean or by a narrow coastal plain that is partly Cretaceous but mostly Tertiary and Quaternary in geologic age. This block, which may be regarded as the central "core area" of the zone under study, extends from north of Ibiaçu to south of Camacã. Along the railway from Poiri to Camacã, the continuous line of cacao cultivation is seldom interrupted even as much as 100 meters. Perhaps most of the well-suited land is already planted to cacao, although there are some uncut forest lands to the south which might prove worthy of being included in this category.

The redeployment of lands in the "core area" would not be imperative in order to secure the diversification of the overall economy of the region if lands less adequate for cacao, in other parts of the Coast, were devoted to other crops. Yet some redeployment of well-suited cacao land is desirable as a measure to insure a more stable income for those who work it. Some land may be temporarily freed for other uses when old cacao plantings die out, but the prospect of high profits soon tempts the landowner to re-established cacao culture. Permanent diversification, therefore, requires an alternative land use that yields an economic return comparable with that of cacao. Furthermore, since cacao is a soil-conserving crop, an alternative land use should likewise be soil conserving, and, ideally, should have less exacting temperature and moisture requirements, so that its yields may remain relatively stable when the drier, cooler years bring shorter cacao crops.

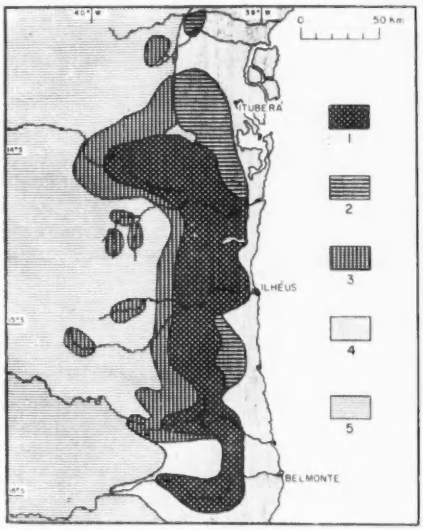

FIG. 2. Suitability of land for cacao on the Cacao Coast: (1) Well suited lands. (2) Marginal soils. (3) Marginal climate. (4) Unsuitable soils. (5) Unsuitable climate.

Rubber, more than any other alternative thus far attempted, comes close to fulfilling these requirements. It has already proved a worthy competitor of cacao on two large plantations located in the municipios of Uruçuca and Una. More recently, plantings have been made on a large scale at Ituberá by the Firestone Company, and on a smaller scale by Japanese and native Brazilian colonists at Una and Ituberá. Though most of the rubber plantings are in the areas marginal to or unsuitable for cacao, the experience of the Mocambo plantation at Uruçuca has demonstrated that rubber can compete with cacao even for the better lands. The oldest rubber trees at the Mocambo plantation were planted about 50 years ago; but shortly afterwards the rubber market was monopolized by the cheap-labor product of Southeast Asia when plantations in that area came to produce

enough to satisfy almost all the world demand. The *fazenda* changed hands and the rubber trees were forgotten, but allowed to stand as shade trees for cacao (which may have been an intended function from the start). When the rubber supply from Southeast Asia was cut off during the Second World War, with resultant shortages in the New World, scouts were sent throughout tropical America in search for rubber trees; the new owners of Mocambo were pleasantly surprised to learn that their cacao was shaded by *Hevea brasiliensis*. After the end of that war, the second rubber boom also subsided. Unsatisfied with prices for raw rubber, the owners undertook to industrialize the latex on the plantation itself.

The factory and plantation could hardly have been better situated anywhere else along the Coast. A railway passes through the premises, connecting the *fazenda* seat with Itabuna and Ilhéus, the commercial centers for the Cacao Coast. Both of these cities have busy airports, and Ilhéus has a port for small ocean-going vessels and lightering service for larger ones. A short, private road joins Mocambo to the highway system that connects Itabuna and Ilhéus with other cities of the interior and with Salvador. The latter, with more than half a million people and an appreciable market in itself, is capital of Bahia State and commercial center for an even larger area. The Mocambo plantation-factory is also joined by highway with other states of Brazil's East, Northeast, and South. However, nearly all of these roads are unpaved and transportation by air is preferred for goods with high value per unit of weight. This last factor no doubt influenced the decision of the Mocambo management to specialize in high-quality latex goods such as surgical gloves. A local supply of fresh latex is a distinct advantage in this type of manufacturing. The expanding Brazilian market readily absorbs the entire output of the factory, which utilizes all the latex the plantation produces. Mocambo is planting more rubber trees and will purchase latex from other local plantations as soon as they are in production.

The use of rubber to shade cacao at Fazenda Mocambo is not conducive to highest yields for either crop.[1] The management is content to maintain the intercalated plantings already established, but does not plan to extend them. There is no cacao shaded by the younger rubber trees—even though they occupy optimum cacao soils. This large operation, complete with industrial plant and marketing organization, can afford the all-out switch to rubber. The small operator might have a greater, and certainly a steadier, long-run income by establishing intercalated plantings of cacao and rubber.

Lands Marginal for Cacao

Lands marginal for cacao occupy a strip of variable width surrounding the well-suited lands almost continuously, except on the east side, where in some places they border directly on lands totally unsuited without any intervening transition zone. Three chief causes for marginality are differentiated on Figure 3: (a) coolness, (b) dryness, and (c) poor soil. A fourth reason, which cannot be so simply differentiated, is improper relief, usually of areas too flat and wet (some of these may be suitable when drained). Although the moisture requirements of the cacao tree are quite high, it cannot withstand flooding even

[1] Leguminous trees, especially *Erythrina velutina*, are the preferred trees for shading cacao throughout the northern part of the Coast. Toward the south, where the forest has only recently been cleared, conveniently-spaced forest trees are left behind to provide the necessary shade. In neither case is much economic return anticipated from the shade trees themselves.

FIG. 3. Surface transportation network of the Cacao Coast and adjacent areas, 1958. Only the principal arteries are shown. The railroads are of one-meter gauge.

for short periods. Too much or too little relief often causes the soil to be too poor or too thin for cacao. In these cases, relief should be regarded as a contributory cause and poor soil the direct cause for the land's being marginal. Despite the hilliness of much of the cacao lands, steepness alone is rarely great enough to preclude the planting of this soil-retaining crop. However, the steeper lands may require more labor in cultivating and harvesting and for that reason some lands that are ecologically suitable for cacao must be considered as marginal from the economic standpoint.

Lands that are on the cool and dry margins for cacao are mostly found in an irregular strip along the inland or western edge of the "core area" and on the upper slopes of mountains lying within it. The coolness of these higher lands is in part a result of increasing altitude, in part an effect of increasing dryness upon nocturnal radiation. The thermal limit in the ecology of the cacao plant is marked by the absolute minimum, rather than the mean temperature. When the temperature drops to within a few degrees of freezing, even for a brief period, cacao is severely set back, possibly because its specific zero temperature occurs in this range and the plant cannot readily adjust to the consequent interruption of its vegetative process. A single cool night can seriously reduce or even eliminate an entire season's crop. On the Cacao Coast, the cooler areas and the cooler years usually coincide with the drier; indeed, because of its effects on nocturnal radiation, dryness is sometimes the cause of excessively cool weather. Thus, low rainfall and low temperature often combine forces to defeat the cacao crop.

On the northern margin of the "core area" and in the disconnected patches of cacao land, planting activity is limited to a few spots of good soils more or less well watered because of local relief. Here the ascent from the coast to the highlands is more gradual so that altitude is less a limiting factor. It is relatively cool and dry simply because the coastal humid area does not extend very far inland. There are no high, steep slopes to trigger off the precipitation of moisture before it is soaked up by the dry, descending continental air masses. Also, on this northern margin much of the soil is too poor for cacao, having been formed on acidic, light-colored igneous and metamorphic rocks or upon the colluvium and alluvium eroded from similar rocks of the Brazilian massif. Still farther inland, to the north and west, spots of land rich and humid enough for cacao become fewer and smaller, until finally one enters upon lands totally unfit for this crop.

Farmers in the northwest marginal area are finding ample opportunity for developing a diversified program by producing foodstuffs—mandioca flour, beans, pumpkins, and dairy products—which find a ready market among the half-million people of the "core area" where land is so valuable for cacao that the owners find it more profitable to buy than to grow staple foodstuffs for themselves and their labor force. As yet the southern marginal area has not shared much in this market because of a shortage of manpower and transportation facilities; these last are in some places limited to the canoe and the pack animal.

There is enough land marginal or unsuitable for cacao to provide many times the basic food supply for the Cacao Coast's population, now approaching one million. In spite of the recent production increases on these two classes of land, much of the food supply still comes from outside areas, chiefly from the interior of Bahia and other states. In-

asmuch as the Cacao Coast affords one of the better markets for the agricultural produce of adjacent areas, it can be expected that some of these, for lack of alternative economic opportunities, may long remain in competition with any attempt to accelerate production of staple foodstuffs in the Cacao Coast area.

Like the "core area" of the Cacao Coast, the area marginal for cacao is mostly hilly, much of it precluding the cultivation of annual, row crops by mechanized cultivation. Since only meager, subsistence-level returns can be expected from annual crops by the traditional hoe culture, tree crops are perhaps the type of land use best adapted to the greater part of the area.

Many of the soils marginal or unsuitable for cacao, because of poor parent material or excessive leaching, are excellent for rubber, which does not require so rich a soil as long as it has plenty of water. Successful plantings of rubber, more than 40 years old, are found in the municipio of Una. An experiment station is maintained by an agency of the Brazilian Government for the purpose of proving clones and promoting the use of the more highly productive ones for grafting.

Much of the latex rubber produced at Una is transformed there into crêpe. Another part is centrifuged, thereby removing more than half the water content, and a chemical is added to preserve it for shipment to São Paulo and other industrial centers of the Brazilian South. One of the reasons for the latter activity is that the buying and selling of raw rubber in Brazil is controlled by the Brazilian Government; centrifuged latex is exempt from such controls, and its sale, though complicated by storage and shipping problems, may be more remunerative to the rubber planters who operate on a large enough scale to afford the extra equipment.

Rubber planting in the municipio of Una is being done mostly in the eastern part, where the land is poorer than farther west and cacao plantings are less numerous and extensive. However, this pattern may have been imposed by the inclinations of the large landowners more than by the quality of the land. Most of the land is still in forest, although some clearings for agricultural uses have been made by soil-wasting, slash-and-burn methods.

A more grandiose undertaking is the rubber plantation of the Firestone Company on the borders of the municipios of Camamu and Ituberá. The existence of this plantation owes much to the instigation of the Brazilian Government. Appalled by the paradox of being the country where rubber production had its effective beginnings, possessing the largest area with climate suited for growing rubber, and yet faced with the prospect of becoming a rubber importer, Brazil took measures to induce and compel the manufacture of rubber articles within its borders. It now requires that any firm engaged in such manufacture shall also engage in, or promote, the domestic production of natural rubber. Many of the manufacturers have made only nominal attempts to comply with these regulations. Firestone, however, having had long experience with rubber planting in Liberia and elsewhere, and having trained personnel available, seems to have undertaken the venture seriously.

The land upon which the Firestone plantation is established consists of second growth forest, believed to date from the years immediately following the liberation of the slaves, in 1889, which was accompanied by the bankruptcy of many of the old plantations. The soils of this vicinity could be used to support a diversified program with rubber and other tree crops. If properly fertilized,

some spots might even be successfully planted to cacao, but the soil is mostly too poor to attract the monoculture of cacao that has prevailed on the richer soils farther inland.

The disposal of the forest cover on the Firestone plantation seems to have been done in a manner almost as wasteful of the timber resources as are the clearing activities of local subsistence farmers. Some trees were cut into lumber for making buildings on the same plantation, but much of the forest was simply slashed and burned. Wisely, the company moved quickly to plant a fast-growing leguminous vine as a cover crop to protect the exposed soil of the hilly land from rapid erosion until the rubber trees reach sufficient size to hold the soil in place.

This plantation development is just beginning; a few thousand acres have been cleared and a nursery is well established. Already some transplanting has been done, and the first harvest is expected in 1961. The company has chosen the location well, avoiding such mistakes as others made who tried to establish plantations in the Amazon forest, where there is a scarcity of labor and a myriad of diseases endemic to the *Hevea brasiliensis*.

The company will not attempt to grow on its own plantations all of the rubber needed by its Brazilian factories. This is a wise policy, for it has been demonstrated in Southeast Asia that small rubber planters, who do not have the tremendous overhead of the larger plantations, can produce rubber more cheaply. Rather than attempt to beat them at the game, Firestone is actually encouraging the small planters by furnishing free seedlings and clones along with orientation for their care. (A similar effort at promotion is carried on by the government experiment station at Una.)

On small farms where one family provides most or all of the labor, it would be possible in this part of Bahia to provide a greatly improved standard of living by devoting a large share of the farm family's land, time, and energy to rubber. Such families could hardly expect to live on the scale of a North American farmer, but they could make a much better living than most of them do now.

Herein lies a disadvantage of rubber from the standpoint of regional development: whether on large or small plantations the commodity has been dependent on cheap labor since the days when the coolies of the Orient put the wild-rubber gatherer out of business. There is no reason to assume that the plantation rubber-tapper should not earn as much for his menial task as performers of similar menial tasks in other regions and in other activities. But as long as there exist wide areas of suitable land with large pools of cheap labor that cannot sell their time for better reward, the world market for natural rubber will be dominated by those areas, and consequently rubber produced elsewhere for that market will also have to rely on cheap labor or subsidies.

It is hardly to be expected that the Cacao Coast can provide its inhabitants and their natural increase with a standard of living comparable to that of North America or Northwest Europe, but at least it can move in that direction. The limiting factor is not the intrinsic resources of the land, but the improbability that conditions outside will allow the inhabitants so generous a reward for their productive efforts. Products like rubber, which under present market conditions could not form the base for so ambitious an economy, can nevertheless move the area up to a much higher level than that of the present and pro-

vide a stepping stone for raising it even higher.

On marginal lands in the *municipios* of Una and Ituberá, the Instituto Nacional de Imigracão e Colonização has sponsored settlements of small farmers, including Japanese immigrants as well as Brazilian nationals. The Japanese come from widely scattered parts of their archipelago. Most of the Brazilians come from the drier parts of the Northeast, particularly from Paraiba. Very few have been recruited from the local area, reputedly because the administrators believe that it would be more difficult for farmers to break with an inefficient tradition while remaining in their old haunts than it would be for colonists starting anew with a fresh change of surroundings.

The Japanese settlers are enthusiastic about rubber planting. Also, they have started plantations of cloves and pepper. Whether the latter ventures will succeed depends not only on the productivity of the soil, but more so on whether prices in Brazil will compensate for the enormous amount of necessary hand labor to the extent that farmers will prefer spices to other crops. For many years Japanese colonists near Belém do Pará, an area seriously short in manpower, have been cultivating black pepper. It is quite feasible that in an area of underemployment like Bahia there should be a place for spice culture. But it is extremely doubtful that the labor cost will allow the Brazilian spices to compete very successfully on the world market.

Pineapple is already one of the leading crops of the colonists at Ituberá. Cultivated by the Brazilian nationals more than by the Japanese, it is particularly adapted to the well-drained, acid soils of the hillsides.

It was hoped that the Japanese would engage in the production of fresh vegetables, and that some of the Brazilians would copy them, thus providing a healthy relief to the area's rather monotonous diet (consisting chiefly of mandioca flour and beans, with sometimes a bit of pork or dried beef). However, the nationals have proved conservative in sticking to their traditional crops as well as to their traditional diet. Moreover, at the Itaraca colony in the *municipio* of Una, it happens that the Japanese have abandoned their traditional crops in favor of those of the Brazilians. Many Japanese no longer plant vegetables even for home use. They are often more successful than their Brazilian counterparts at growing manioc and beans. The sorry case of the Itaraca colony is caused by its inaccessibility to a market adequate to absorb the produce of the several dozen farm families. The mouth of the San Pedro River near Una is navigable for coastwise shipping only for two short periods each month, at the spring tides. Furthermore, the rough highway journey to Itabuna and Ilhéus requires several hours; and the few vehicles provided to run errands for the colony are not adequate to transport more than a small fraction of what the settlers could produce. Consequently, those cities, with populations of around 40 thousand each, remain ill-supplied but potentially substantial markets.

The location of the Ituberá colony with respect to markets is much more fortunate, as it lies but 10 kilometers from the port of Ituberá. In early 1958 this colony included only nine Japanese families. Their success in the vegetable trade indicates that a much larger number might be so employed. They have already shown that a demand for vegetables can be created even in that part of the Cacao Coast where personal incomes are the very lowest and dietary traditions are firmly entrenched. An

intensive publicity campaign succeeded in introducing beets, previously unknown locally, as well as in marketing a larger volume of vegetables which were already known but had rarely been available. With the local market still unsaturated, the Japanese vegetable growers are already reaching out to develop other markets—at the nearby villages and towns of Taperoá, Nilo Peçanha, and Valença. From as far away as Camamu, traders make trips of several hours by motor-driven dugout canoe to carry away the produce of these gardeners.

Possibilities for further expansion of vegetable gardening around Ituberá are enormous. There is ample land that could be dedicated to it. The estuary from Serinhaém to Ituberá is navigable at high tide for coastal launches, which can carry the fresh vegetables to Salvador in an overnight trip, in less time and at far less expense than by trucking over the long, bumpy route around the Bahia de Todos os Santos. There is at present a dearth of fresh vegetables on the Salvador market, partly because much of the surrounding area is infertile, but mostly because the agriculturists thereabouts have been reluctant to engage in the business. At present, most of the vegetables sold at Salvador are brought by refrigerated ship all the way from São Paulo—where, incidentally, they are grown by Japanese colonists. The northern part of the Cacao Coast, where most of the soil is too poor for cacao, is in a favored position for supplying the state capital with fresh vegetables; the southern part of the Coast is at a disadvantage, for the added distance would necessitate some sort of refrigeration, and thus greatly increase the investment required by the operations.

The yellow lateritic soils around Ituberá will no doubt suffer considerable fertility loss after a few years of intensive cultivation. At the time of our visit it was too early to tell how severely this loss would affect the colony, which had been started scarcely three years before.

The colony of Itaraca in Una Municipo has been established for about seven years. The Japanese families arrived at different times. Many of them apparently had no serious intention of staying in the area, but were mainly interested in getting to Brazil in order to join relatives and friends who were already established in São Paulo. Others became disillusioned with the prospects at Una and abandoned the colony. No doubt a few more will follow suit, but it appears probable that at least a couple of dozen Japanese families will remain permanently.

The question of their fate is well intertwined with that of the future for colonization in all Brazil. It is no longer the official policy to encourage the establishment of large groups of foreigners who may persist in clinging to their own way of life, forming cultural islands within the country. Now the idea is not to import foreign culture or foreign blood to populate the country; the prolific Brazilians are confident they can do that for themselves. What the policymakers want of immigration is for individuals and small groups with advanced technical skills to come and live among the Brazilians, so that the country will progress not only by the work of the immigrants but also by the diffusion of their skills among the natives. From this attitude comes the current policy of mixing Japanese immigrant farmers with an equal or larger number of Brazilians. Judging from the experiences at Una, as the immigrants abandon their old way of life in favor of the Brazilian, they sometimes abandon also those skills and

qualities which the Brazilian leaders are anxious to import. When they come in greater numbers, the immigrants themselves provide a market for some of their skills that otherwise are superfluous in an area like Una. Though the larger groups may require one or two more generations to become assimilated, they have a greater probability of preserving their more desirable traits as well as imparting them to the surrounding population.

Lands Totally Unfit for Cacao

The above described marginal lands are in many places transition zones where cacao culture overlaps with activities that are economically dominant in the neighboring lands which are totally unfit for cacao. Thus on the west and northwest one passes through an area where cacao shares the land with food crops and cattle-raising, and then into drier and cooler areas where cattle are raised but not cacao. At other points, however, one passes abruptly from well-suited or marginal cacao lands to a totally different land-use complex without encountering a transition zone. Such sharp changes coincide with contact zones of widely different geological formations.

On the inland side, there are contacts between basic metamorphic rocks, parent materials of good cacao soils, and plutonic formations, highly quartzose and acidic, which are parent materials of poor soils. The contact zones present very irregular outlines, differentiating the land-use potential in a mosaic manner which the very generalized map (Fig. 3) does not pretend to show; a detailed land-use mapping of the Coast has yet to be undertaken. The vegetation cover on these poor soils is in large part forest, almost all of it cut-over in the north, yet including some virgin forest in the south. Open lands are devoted to grazing, as are the cut-over forest areas where closed forest cover has not yet been re-established.

The eastern edge of the potential cacao lands is more readily recognized in the field and is considerably easier to map, coinciding generally with the contact of metamorphic rocks with sedimentary formations of fluvial and marine alluvium. Most of this sedimentary area, which is 20 or more kilometers wide in places, is extremely sandy. Exceptions are the mangrove areas, which may be intrinsically rich but for practical purposes must be regarded as having no agricultural land-use potential until such far distant future when Brazil might become so short of land as to justify construction of the necessary polders. Part of the sandy land is under grass, some of which is used for grazing. Another part of the sandy land is in medium-height forest (*capoeira*), which is of little value as a source of lumber.

Three palms, the coconut, the *dendezeiro* (African oil palm), and the *piaçaveira* (a native plant which yields fiber for making brooms and stiff-bristled brushes), provide the leading products of the sandy coastal zone.

Coconuts are grown on large plantations and in small groves, especially along the shoreline. Most of the palm oil and nearly all of the *piaçava* fiber are gathered from spontaneously growing plants, although some attempts are being made to produce them on plantations. Both the *piaçaveira* and the *dendezeiro* can withstand the alternate periods of flood and drought (although rarely a month passes without at least 50 cm. precipitation, a short spell of two or three weeks without rain can severely dry out these porous soils).

Piaçava fiber is gathered by day laborers, usually on a piecework basis. The land on which it is cut is referred

to as a *corte de piaçava*, not a *fazenda*. Only the loose fibers between the fronds and the trunk are used. The fibers, coffee-brown in color, are combed out and tied in bundles for shipment. Very little transformation of this raw material takes place in the Cacao Coast.

Palm oil is gathered by the poorer people, many of whom have no land at all but gather from public lands or from private holdings. In either case, much of the return goes to the owner of the machinery used to extract the oil from the husky covering around the palm kernel. Little is being done at present to extract the oil from within the kernel itself. Sometimes women and children while away the hours cracking palm kernels to feed pigs, which find them too hard to crack with the teeth.

Recently the Matarrazo Company, dealer in fats and oils and a leading manufacturer of soap, acquired an extensive tract at the tip of the Serinhaém Peninsula, for the purpose of establishing a scientifically-managed plantation. The soil of the area is extremely sandy, much of it containing only 2 per cent clay, which is much less than the 20 per cent minimum recommended for the oil palm.

While local opinion holds that the company chose one of the worst possible sites, the Dutch agronomist in charge (who was absent at the time of our visit), was quoted as saying that the plantation would succeed, emphasizing that there is no such thing as poor soil for the Dutch, since they know how to make it into good soil. That may be economically sound reasoning for overpopulated areas like Holland or the Orient, on which experience, no doubt, the statement was based; but in a country with so much unused land as Brazil it seems preferable to devote the time and energy to soils and crops already appropriate for one another.

The land at Serinhaém, marginal at best for the oil palm, is far better adapted to growing coconuts, without any elaborate preparation. This has been demonstrated by one large plantation of the same Matarrazo Company, which is already in production.

Seemingly the difficulty and expense with the oil palm at Serinhaém is in getting it started. The land has a nearly flat aspect, but small undulations leave many spots inundated during rainy weather, whereas the intervening areas, perhaps as much as one-half meter higher, dry out considerably during dry weather. Neither situation is favorable to the palm seedling. However, the presence and productivity of many wild oil palms on the same tract indicates that the plantation may do well once established. A drainage system has been plowed across the area with tractors; and bog lands under the same ownership provide a highly organic peat that is used for mulching the young seedlings while they are getting a root-hold on the white sandy soil.

Brazil, like other tropical countries, is able to draw its supply of fats and oils from many plant sources. There being much available land suitable for each oil-bearing plant, the economic advantage passes to those plants that can be grown near the leading markets. Bahia is not so well situated as other Brazilian states which have larger markets to absorb the vegetable oils produced on their lands. For many uses, several different vegetable oils may be used interchangeably. In some cases elaborate conversion processes are involved so that it is often more economical to haul a naturally appropriate oil a few hundred extra miles. Since Brazil produces a great variety of vegetable oils, Bahia might do well to concentrate on *dendê*, where possible, even though the same lands are more readily adapted

to coconuts, because there are many Brazilian states producing coconut oil, while Bahia is one of the few that produces significant quantities of palm oil.

There is a widespread notion that much of the flat, coastal plain would be very remunerative if planted to rice. We have little doubt that this is true of the less sandy parts, especially the boggy soils. Presumably planters would sow the upland varieties of rice, thus avoiding the problem of keeping the fields constantly inundated. But some irrigation may be required, even for the upland rice. During most of the year the rainfall is enough to sustain rice culture, but dry spells of two to four weeks' duration coming at certain times, may cause crop failure unless standby irrigation facilities are on hand. As there is plenty of ground water, shallow wells with portable pumps and hoses should provide an adequate system. It would take some close figuring to determine which is more economical in the long run: to put in an irrigation system that will be idle much of the time; or to withstand an occasional short crop or crop failure.

LIVESTOCK RAISING

Livestock raising in the "core area" of the Cacao Coast is for the most part limited to a few chickens and pigs, occasionally sheep, goats, or milk cows—usually less than could be used on the *fasenda* itself. The pasture land that is found at *fazenda* centers, sometimes involving a few tens of hectares, is mostly intended for the maintenance of work stock: oxen, mules, and burros. Some oxen may be raised on the *fazenda*, but practically all of the mules and burros are brought in from the great ranching zone of the interior highlands. Thus it might be in order to distinguish between "livestock raising" and "livestock keeping"; all work stock would be included in the latter term, but part would be excluded from the former.

Both from marginal lands and from those entirely unfit for cacao, much forest has been deliberately removed in order to establish pastures. Where soil and climate permit, some cattlemen grow cacao for a decade or two on the new clearing; later, when yields decline, grass is allowed to take the place of the cacao trees as they die out. Mixed farming with cacao and cattle is firmly established on the inland or western edge of the cacao lands, where the foothills are higher and cooler. Another zone still higher and farther inland is appropriate for cattle but not for cacao.

Throughout the Cacao Coast most of the cattle are Cebú crosses, locally referred to as *Indúbrasil*, which, to outward appearances at least, have a predominance of Cebú traits. The native stock descended from early Portuguese importations, the so-called *gado crioulo*, has largely disappeared from the coast of Bahia and from many other parts of Brazil. Milk cows include large numbers of grade Holsteins as well as Cebú-Holstein crosses.

In parts of the cattle-raising areas, along the better roads which give ready access to the growing urban centers of Itabuna and Ilhéus, dairying is making rapid progress. Methods are primitive, with little or no official control over sanitation. Many dairymen milk only once a day, in an open lot. Most cows are fed only on the pastures, which fortunately are green the year round.

The Bahian is not by tradition a great consumer of dairy products, either by way of his African or his Portuguese heritage. Cheese is perhaps the most popular milk product. Milk and butter are rarely consumed except at breakfast, the milk being boiled and mixed with coffee. As a separate drink, milk is sometimes used by children, less often

by women, and almost never by men, unless sick and under the compulsion of a physician's orders; even then, a man may take care to avoid being noticed by other men while drinking it. To increase the effective demand for milk is not simply a matter of giving more buying power to the poorer classes, as there is a shortage of desire as well as demand. Despite these limitations of the potential market, the dairymen of the Cacao Coast cannot yet supply the present effective demand. Much milk is imported from other states, even from other countries (Denmark, Netherlands, United States), in powdered, condensed, or evaporated forms. At the same time, the Cacao Coast has enough land suitable for dairying that it could easily satisfy its own needs and even become a milk-exporting area.

Increasingly popular forms of milk consumption are in ice cream, sherbet, and milk drinks. It is not considered undignified for a man to use milk in these forms. *Sorveterias* (literally "sherbet bars") are found even in the smaller villages and must be regarded as signs of an improved level of living, for in most places they did not exist a few years ago. These businesses can usually buy fresh milk when no one else can; yet, to supplement the local supply, they must rely on the more-expensive preserved forms, which, because of transportation difficulties, are not always available. The shortage of milk is a chief factor limiting the sales of the *sorveterias*.

In December of 1957 we were told that not a single milk cow was to be found in the eastern half of the municipio of Ituberá. The excuse was offered that there was no land open for pasture, most all of the area being covered with second growth forest except for the few clearings planted to subsistence crops.

As for its meat supply—beef, pork, and fowl—the Cacao Coast could produce a much greater share than at present. However, in the case of beef, it is hardly desirable to aim at local self-sufficiency. Immediately to the west is a large ranching area, which includes some of the more progressive ranches of the State of Bahia, where much land has at present little economic use other than for cattle raising; this area can probably continue to supply its chief markets, the Cacao Coast and the city of Salvador, at a cost competitive with that of the cattle-raisers of the Coast.

FORESTRY

The Southern Bahia Coast contains possibly the last sizable virgin remnants of Brazil's Atlantic Coastal Forest. The more extensive of these remnants are in the extreme south of the State, beyond the limits of what we call the Cacao Coast, but some are encountered within the latter area, especially in its southmost *municipios* (Una, Belmonte, Canavieiras, Potiraguá). Our traverse by muleback from Tremembé to Ibiaçú in part led through a tract with trees more than a meter in diameter and up to 40 meters or more in height—to every appearance a virgin stand. From an airplane view, there appeared to be more such tracts on the steep, upper slopes of the Serra Grande, northeast of Uruçuca. Only the inaccessibility of these woods has saved them from the axes of the lumberman and the slash-and-burn farmer. As highways and cacao planters further penetrate the forests, forceful conservation measures are urgently needed.

In the southern part of the Coast, the new cacao plantations have been established without clear-felling; only the undergrowth and some of the mature trees were removed, leaving a canopy of crowns of larger trees to shade

the cacao. The shade trees may be regarded as part of the forest resource only in a wider sense. They do aid in conserving soil and water, thus maintaining the forest ecology. They provide seed for natural restocking of any clearings that may be abandoned nearby. But the logging of shade trees from an established cacao plantation would involve risk of serious damage to the latter; so, as an immediate timber resource the shade trees must be disregarded.

The principles of national resource conservation do not necessarily oppose the diverting of forest land to tree crops and pastures, provided the country needs the land for these uses as much as or more than it needs the forest, and provided that the felled trees be reasonably utilized. In most clearings throughout the Cacao Coast the trees are burned or left to rot where they fall. Some value is derived therefrom for fertilizing the soil, but this is only for a few seasons, as both organic matter and ash are rapidly broken down and removed in the warm, rainy climate.

A critical local problem in some areas is that of a supply of firewood for heating the kilns (*estufas*) for drying cacao in wet weather as well as for operating the railroads and small thermo-electric plants. The shortage is especially felt near the older *fazendas*. The demand for firewood is supplied from the more accessible woodlands, some of which occupy the poorer lands. Unfortunately, many of the newer *fazendas* are so inaccessible that the wood from their clearings cannot be moved cheaply enough to supply this market.

The myriad of species presents problems of timber utilization and marketing: in the first place, to know the working qualities of so many timbers; then, to make them known to prospective users; and finally, to find enough trees of a given species to fill an order. These are, of course, problems common to most tropical forests. Stands of timber more uniform than those of Bahia, as the *Araucaria* or *Pinho* of Paraná, have a decided advantage in the large city markets of the Brazilian South. However, the Brazilian market is far from saturated and it could readily absorb many timbers that might be salvaged from the clearings for cacao in Bahia.

The almost total lack of local access to roads in the rugged and wet terrain is a principal handicap to forestry utilization in the Cacao Coast. Deforestation precedes rather than follows improved transportation. Clearings for cacao advance into the forest a distance equivalent to a day's muleback journey or so ahead or to one side of motorable roads. By the time proper vehicles can reach within logging distance of the forest, much valuable timber from the clearings has gone to waste simply for lack of an outlet.

At Ituberá, a sawmill has been operating with modern equipment for several years. It connects with coastwise shipping, at high tides, and with an all-weather highway that transects an area of older second-growth forest (60–70 years). One informant stated that the mill processes logs from as far distant as Itambé and Itapetinga (295 and 345 kms. distant, respectively).

Another undertaking, smaller but impressively demonstrative of possibilities, is the extraction of poles, for telephone, telegraph and electric lines, which is being carried on near Una. From time to time, a small coastwise vessel, with a draft of about eight feet, enters the Una River to a point near the municipal seat and embarks a cargo of some 250 poles for Salvador.

Among the precious woods found, although now seriously decimated, in the forests of the Cacao Coast are *cedro*, *jacarandá*, *massaranduba* and *sucupira*.

Scientific forestry could be undertaken, starting with selective cutting and regeneration of desired species on cut-over lands, especially on the better drained parts of the coastal flats and on the northern and western edges of the Cacao Coast where the light-colored, acid, igneous rocks of rugged hills give origin to poor soils with little agricultural potential. If started soon, the new trees would be producing lumber within three decades—by which time the Brazilian coast dwellers will be feeling more acutely the timber shortage that they have been creating over the last three centuries. With the forests of the Amazon so difficult to log and so far from the national markets, and with those of Paraná further reduced in area, the situation of the forests of the Bahia Coast should be increasingly advantageous in years to come.

FISHERIES

Fishing is an important occupation along the ocean shore and the associated bays and estuaries. As an item in the diet of the Cacao Coast, fish is mostly limited to the shore area and to a few inland centers like Itabuna where the product can be transported by truck or rail within a few hours after landing. Some fresh-water fish is taken from streams, but it is far from adequate to supply the inland market.

Along the more shallow shorelines, traps are used to catch fish brought in by the tide. Dugout canoes and small launches exploit the deeper waters of the bays and to some extent the open sea. The *jangada* (a type of sea-going sail-raft) is not so commonly used along the Cacao Coast as at Salvador and farther north.

Optimism about the fishery resource should be restrained until a thorough technical survey has been made. At the time of this reconnaissance, the Comissão de Planejamento Econômico was taking preliminary steps toward such a survey of the fisheries of the coastal and adjacent deep-sea waters, and the Banco do Nordeste had been sponsoring studies on fish culture in ponds and other inland waters. Even at this stage, however, it seems safe to state that the fisheries could furnish a much larger catch than is at present taken by antiquated equipment to meet a limited demand, that of the fishermen's families and the villages on or accessible to the shoreline. With improvement of inland roads and refrigeration facilities, fresh fish could be sold to several hundred thousand people who now eat little or none, not because they cannot pay for it, but simply because it is not available to them. Any surplus from the Coast could be moved by rapid or refrigerated vessels to a ready market in Salvador, or it might be canned for shipment to the highland regions of Brazil, which areas are largely lacking in fisheries.

The shallow bays and inlets, like those at Camamú, Ituberá and Valença, provide favorable conditions for the construction of salt-water ponds for fish farming of the type that has been so successful in Japan. The hilly areas of the Coast also furnish opportunities for construction of fresh-water ponds for the same purpose.

Friday is not so great a boon to the fish market in Brazil as in other predominantly Catholic lands, for the inhabitants have been excused from the weekly abstention from meat by a papal dispensation, dating from colonial times, because of the shortage of fish in the country.

The promotion of fish as food encounters among the populace of Bahia no traditional aversions such as those that restrict the use of milk (see pp. 244-245) and other foods with which the plan-

ner might seek to improve the local diet. Even among that part of the population which eats considerable meat, it is important that more fish should be eaten, particularly salt-water fish. For the larger part of the soil of eastern Brazil has, through long exposure to weathering, been leached of most of the few basic minerals that were in the acidic parent rock. Since the soil is deficient in minerals, the plants growing on it are deficient also; so too must be the animals that feed upon these plants—including the men who feed exclusively upon these plants and animals. Fish is an ideal food for balancing the mineral-poor diet prevailing in large areas of coastal and interior Brazil. Albeit the cacao-producing lands are not poor in basic minerals, much of the food consumed on the *fazendas* is produced on the mineral-poor soils of nearby areas.

MINERAL RESOURCES

Like most of Brazil, the Cacao Coast has been intensively prospected only for the precious metals and stones—gold, silver, and diamonds. Attempts to locate other minerals have been sporadic and partial, leaving vast areas where little or nothing is known about such resources. In recent years there has been considerable surveying of geologic formations that might contain exploitable petroleum. Much of the country, where the igneous massif outcrops at the surface, can be eliminated at a glance, narrowing down to a few potentially productive areas. One proven field is that of the Recôncavo, the area surrounding the Bahia de Todos os Santos. This field might be found to continue southward along the narrow fringe of sedimentary formations of the northern shore of the Cacao Coast; however, the area of potentially oil-bearing strata is of very limited extent. Furthermore, the discovery of petroleum does not always bring to the producing area as great a boon as the economic value of the resource might lead one to expect. Whether the resource is controlled by government monopoly, as in Brazil, or by private capitalists, often it is quickly transported to outside areas at the convenience of the controlling interests rather than used to develop the region where it is found.

The sedimentary fringe of the Cacao Coast is already yielding two important minerals, barite and gypsum. Barite is mined by open-pit methods at Ilha Grande, at the entrance to the Bay of Camamu and the Maraú Estuary; other nearby deposits are yet to be tapped. Gypsum is being pumped from wells near Gravatá, on the left bank of the Maraú Estuary.

The barite operations are conducted by a subsidiary of a North American company. All or most of the production goes to Venezuela where it is used as a constituent in drilling mud. Further processing near the mine could considerably reduce the shipping weight. However, any savings in transportation costs would be more than offset by the additional duty that the finished product would have to pay on entering Venezuela.[2] As Brazil's own oil industry continues to progress it will need the output of Ilha Grande barite for mixing its own drilling muds. Perhaps a more complete processing will then be carried out at the mine.

Manganese deposits occur in the municipio of Maraú and recently were being surveyed to ascertain their commecial possibilities. Unfortunately, we were not able to learn the results of the survey.

The monazatic sands of the municipio of Prado possibly extend also into the

[2] Verbal information from one of the managers of the ore processing plant.

municipios of Belmonte and Canavieiras. Further exploration is necessary to determine whether the sands are of sufficiently accessible volume and proper concentration to warrant extraction.

In the western part of the municipio of Canavieiras an abundance of native sulphur has been reported. The feasibility of exploiting this mineral depends not only upon its concentration but also upon whether the nature of the encompassing geologic structures will permit extraction by dissolving and pumping out the sulphur, for the fumes of this mineral in the native state are highly noxious to the miners.

Throughout the entire Cacao Coast there is an abundance of the nonmetallic mineral building materials: sand in the flats near the coast; stone and clay for making brick and tile in the metamorphic foothills and on the slopes of the igneous massif; and there are rumors that a natural cement waits to be mined in a limestone area near Potiraguá.

WATER RESOURCES AND ELECTRICAL ENERGY

Water resources are abundant and well distributed throughout the area and throughout the year: rain for crops, woods and pastures; surface and ground water for domestic and industrial needs. Streams are becoming less important for transportation as more roads are built, for they are navigable only by small boats and canoes, being mostly shallow and with their mouths choked by sandbars. A short distance upstream occur falls and rapids, long a hindrance to transportation, but now an aid in regional development; from them is coming the electrical energy to industrialize the area and provide its inhabitants with a better standard of living. So far, only some 8000 hydroelectric horsepower has been installed; but projects under-way would add 50,000 by 1961, and another 70,000, at least, awaits easy development. The largest sites are at Funil, on the Rio de Contas, near Ubatã, where generators for 30,000 horsepower are about to be installed; and at Salto da Divisa, on the Rio Jequitinhonha at the Bahia-Minas Geraes boundary, with an estimated potential of 50,000 horsepower. There are many smaller falls and rapids confined by V-shaped valleys where they can easily be harnessed to electrify *fazendas*, villages, and factories, as already has been done at the falls of Pancada Grande, near Ituberá, and at Acaraí, near Camamu.

In many of the smaller villages and towns having no public-service electrical systems, a few families have their own generators driven by wind or by internal-combustion engines. Where public service current is available, it is mostly supplied by small Diesel or steam-driven plants, operated only at certain hours, to furnish light in the evening and early morning, and occasionally also at noon for the benefit of radio listeners. Peak loads in the evening may overtax a system so much that lights are too dim to read by and radios fail to operate. Sometimes customers are limited to 25-watt bulbs. Collections are made per dwelling in some places, per outlet in others. Many communities operate a loud speaker system, in part paid for by advertisers. Played more loudly than the limits for smooth reproduction, the speaker cone adds a raspy accompaniment to the music as it blaringly challenges the traditional quiet of the village on the soft tropical evenings.

The completion of the larger hydroelectric projects in this area, long accustomed to shortage, is likely to create a temporary glut on the market until the populace can adjust itself to use of the increased supply. It is to be deplored

if this temporary state of affairs discourages the execution, or leads to the abandonment, of smaller hydro- and thermoelectric plants, for the water-power sites have not the potential to satisfy the area's long-term needs for electricity. Allowing for the needs of new industries and for household uses commensurate with improved living standards for a growing population, the regional planner must recognize that the water power resources of the Cacao Coast could never supply it with a per capita consumption of electricity on par with the highly industrialized regions of Western Europe and North America. The resources might be adequate, however, to bring the Coast to a more modest intermediate goal, to a level equal to that of the industrialized Brazilian South. Eventually the Cacao Coast will need thermoelectric plants much larger than those that supply Itabuna and Ilhéus. It is not too early even now to begin planning for an integrated system of hydro- and thermoelectric plants. Voltages and cycles should be standardized and a network of interconnected distribution lines planned so that no community need be left without current during the failure of its normal power source.

TRANSPORTATION

Steady progress is being made on the intraregional road network, and within a few more seasons completion of the coastal highway will greatly improve the links of the Cacao Coast with other parts of Brazil. The need for neighborhood "farm-to-market" roads has yet to be answered effectively.

At present the only paved highway is that between Ilhéus and Itabuna (one of two paved highways in the entire State of Bahia). The coastal highway, which is the main trunk line, and the other principal highways are of graded earth and crushed stone. Other roads are of unmetalled earth with little or no improvement. The larger towns have some paved streets and some of the older centers have cobblestone pavements, but many streets in all towns and all of the streets in many villages are of simple earth.

Established rather than anticipated economic interests have been the factors determining the construction and routing of highways in the Cacao Coast. Trunk lines have been put through connecting the cacao-producing areas with the chief port cities, Ilhéus, Ituberá and Salvador—decidedly convenient for the cacao buyer, but less so for the planter who must bring his harvest to the trunk lines or short feeder roads by muleback or canoe. The main trunk line highway is well graded as far south as Camacã and is passable by truck to a point just south of Itapebi and beyond the main cacao producing areas.

The newly-developing areas are left to their own devices, simple trails by which the farmer can enter with his axe and a few supplies. When his cacao begins to produce, he must trek over the same narrow trail with the harvests until these are impressive enough to prevail upon the politicians that there is need for a road.

The short railway lines (approximately 100 kms.), now somewhat duplicated by the highway system, are still important carriers, although they have not expanded in recent years.

Scheduled airways serve Ilhéus, Itabuna, Canavieiras, and Belmonte, linking them with other centers of the Brazilian Coast and with the interior highlands. Charter services by light plane (known locally as *têco-têco*, for the machine's resemblance to a large bird of that name) hop passengers and urgently needed goods to a great number of villages and *fazendas*.

Traffic on the rivers and bayous has actually declined sharply in those areas now served by the automobile and the airplane. Rivers Jequitinhonha and Pardo are navigable by launch and canoe about as far as the inland margins of the cacao-producing lands. Formerly, supplies for much of northeast Minas Gerais moved up the shallow Jequitinhonha, but that area is now served by the highland road network. Other streams have much less navigable length and are of limited value in moving the cacao harvest, for most of the producing lands are uphill and inland from the fall line.

The Cacao Coast is poorly endowed with ports. With one exception, its bays, river mouths, and estuaries can be entered only by coastwise vessels of shallow draft; many small ships can enter some ports only at high tide, and in some cases only at spring tide. Exports are handled in either of two ways: (1) transferred to oceangoing ships by lighters at Ilhéus or (2) moved from smaller ports by shallow-draft vessels to Salvador for transshipment.

The estuary of Maraú, five fathoms deep at its mouth, has gone undeveloped until recently for lack of immediate access to the hinterland. Transoceanic vessels now enter regularly to carry away the barite of Ilha Grande. This relatively deep anchorage, when properly connected with the interior transportation network, may one day replace Ilhéus as the leading port of the Cacao Coast.

INDUSTRY

With solutions to problems of energy and transport already in sight, it is well to examine the beginnings of industrial development in the Cacao Coast area and the outlook for it. Further development of two types of industrial activity should be particularly encouraged: (1) processing of products which have heretofore been exported as semi-finished or raw materials; (2) production for the home market, to meet the effective demand of the area's own hundreds of thousands of aspirants to a higher standard of living.

Examples among present undertakings in the first group are: (a) the cacao processing plant at Itabuna; (b) the rubber plantation-factory at Mocambo, which utilizes its entire latex output for making dipped rubber goods; (c) the crêpe rubber plant at Una; and (d) the lumber mill at Ituberá. In addition to the ample room for expanding these industries, there are opportunities in the further transformation of other raw materials of the Coast: the barite of Ilha Grande, for mixing drilling muds (see p. 248); coconut oil, palm, and palmkernel oil for making soaps and foodstuffs; piaçava fiber, for making brooms and brushes.

Entrepreneurs have not yet fully appreciated the opportunities of the home market; local industrial production is low in volume and remains mostly on a small-factory or workshop basis. The most promising activities are those which take advantage of a local market already established and growing, draw upon local raw materials, and involve operations for which local labor has, or can readily acquire, the necessary competence. Such activities include the making of brick, tile, furniture, and leather goods; the processing of milk and its derivatives; and the bottling of soft drinks.

The amount currently spent for such articles imported from other areas is alone enough to support considerable industries. Savings on transportation costs give the local manufacturers a significant advantage. With the passing of part of these savings on to the consumer in the form of lower prices, not

only are the old customers able to buy more, but also goods are made available to thousands of new consumers who previously were not quite able to buy them.

To illustrate the situation, an excellent case in point is the market for *guaraná*, favorite soft drink of millions of Brazilians. In 1958 a small bottle sold for Cr$3–4 at Salvador and for Cr$6–8 at Ilhéus and Itabuna. What is more, after being brought by land or sea to Canavieiras, *guaraná* was being flown to Belmonte, where it retailed for Cr$12. In isolated places it might sell for Cr$15.

This may be compared to the situation for beer. The entire state is supplied from breweries in Southern Brazil. The retail price in Salvador was Cr$30 per liter; in the Cacao Coast it might cost Cr$35–40, or even Cr$50. Thus the price extremes had a proportion of nearly 1:4 for *guaraná*, less than 1:2 for beer. This reflects how much prices were a function of transport costs. The price of beer, with a higher value per unit of weight and being better packaged (in larger bottles) for economical shipment, was proportionately less aggravated by transportation costs than was the price of *guaraná*.

The actual and potential market for *guaraná* could sustain one or more fair-sized bottling plants without threatening the position of the small plants now making carbonated beverages in the Cacao Coast. The greatly increased consumption of such beverages in recent years bears witness to the growing purchasing power of the populace.

Every year more thousands of the inhabitants of the Cacao Coast are able to afford better houses and furnishings, better food and clothing, and a few more luxury items than the year before. Entrepreneurs are at last beginning to produce for this market. Previously they had concentrated on production for export, importing only a few luxury items for the more well-to-do classes, along with the bare essential foodstuffs and production tools to keep the laboring class alive and busy. Gradually the consumer market has grown until it no longer need be regarded as a sideline; no longer just a market to import for, it is a market worth producing for.

HUMAN RESOURCES

The improvement of living standards is a prime incentive for the people of the Cacao Coast to diversify the regional economy. In the accomplishment of this goal they themselves may be regarded as the human resources; as such they have certain negative facets to contend with.

Facilities for education are ridiculously inadequate. More than three-fourths of the population of some municipios is illiterate and as yet the school system only accommodates a fraction of school-age children. To cite an example of the lethargy with which the problem is being attacked, a new secondary school building (*ginásio*) at Canavieiras was left unoccupied during the year 1957 because the municipal funds had been exhausted in the construction and no money was available to employ teachers.

Dietary deficiencies and diseases among the labor force cause a high loss of man-hours from work and a low efficiency rate for the hours that are worked. Medical facilities and sanitary conditions are being improved, the number of personnel working on such problems having increased; but these achievements must be measured in relation to the tremendous growth of population resulting from migration and from a high rate of natural increase.

Of potentially great effectiveness are measures undertaken by several Brazil-

ian government agencies in collaboration with the Point Four Program of the United States International Cooperation Administration, to instruct the rural populace in farm- and home-improvement methods, somewhat along the lines of the Agricultural Extension Service in the United States. The shortage of agronomists and other trained personnel to conduct such a program is a handicap that the Brazilian educational system will probably be unable to overcome for several decades.

From the impoverished, drought-stricken lands of Northeast Brazil, which border on the Cacao Coast, comes a continual influx of illiterates and unskilled workers whose desperate circumstances lead them only to expect, and get, a very low standard of living. Their presence adversely affects one's overall impressions of the Cacao Coast, minimizing the effectiveness of progress made by the inhabitants of longer standing.

It would be misleading to suppose that the cultural and economic problems of any region should, or could, be solved without regard to those of nearby areas and peoples. Yet the nearness of the Cacao Coast to a cheap labor pool should not be allowed to encourage the establishment of crops and industries that must rely on cheap labor in order to survive; such would be contrary to the long-run benefit of the migrants, as well as detrimental to the region.

In an underdeveloped area such as this, with so many resources only partly used and without a great population pressure, it is feasible that the planning goal should be a high standard of living. This cannot be attained by encouraging activities with a low output per worker; rather it requires crops and industries that attract the skilled and the educated.

Proper planning would encourage the diversifying trends already present in the Cacao Coast. Some activities, like rubber planting and the development of the unused but limited hydroelectric potential, cannot be expected to lift the area to a very high level of material welfare, but can be recommended as conducive to intermediate goals.

The resources of the Cacao Coast are adequate to provide its growing population with steadily rising levels of living. Such improvement is a practical means to its own idealistic end: while providing an expanding market for local industries, it helps the area to conserve and utilize two prime production assets—the better educated youth and the newly well-to-do citizen. More of them can now stay in the area and still enjoy those cultural amenities which might otherwise induce them to migrate. Thus their accumulations of knowledge, skill, and wealth are retained and applied in the diversified development of the Cacao Coast.

ACKNOWLEDGMENTS

The authors acknowledge the generous support of Dr. Edgard dos Santos, Rector of the University of Bahia, who made available the funds for carrying out this reconnaissance. The authors also express their thanks to Mr. Alexander Hoy, graduate student at the Department of Geography, University of Nebraska, for assistance in preparing the maps.

ECONOMIC GEOGRAPHY: A FRAMEWORK FOR A DISCIPLINARY DEFINITION

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RECENT contributions to this journal have admirably summarized and pertinently discussed some of the problems confronting economic geography.[1] Current developments within the subject and the impact of more clearly formulated concepts concerning space relations have encouraged economic geographers to think anew upon the nature and scope of their subject. Whatever the outcome of these deliberations, it will become increasingly necessary at some stage to formulate a disciplinary definition of the field and scope of economic geography. The value of disciplinary definitions has been questioned, but there is a need, as McCarty has suggested, "for developments of new and more useful systems of classification in economic geography."[2] Systems of this type need not of necessity be sterile. In precise terms, a good disciplinary definition of the subject should:

(1) Clearly identify the main avenues of work and their relation to economic geography and to geography as a whole.
(2) Allow a more precise knowledge of the position and potential of any particular problem or aspect within the scope of economic geography to be secured.
(3) Encourage and stimulate specialization of a kind which in the long run will provide better opportunities for synthetic studies in general and regional economic geography.

In this process, *classification* of existing material must be regarded as a foundation. Definitions *de novo* tend to favor novelty at the expense of what is already known, tried, and accepted. A classificatory approach, on the other hand, is better able to maintain the most enduring element of all definitions of geography: cosmos.

The framework about to be discussed (Fig. 1) was drawn up according to a number of principles, of which one must be made clear at the outset. This is that economic geography can properly be defined only in terms of the parent subject, geography; and in a classificatory scheme, this principle implies structural isomorphism. In addition, while precision demands a taxonomic approach, the number of coined terms must be reduced to an absolute minimum; albeit at the risk of giving new meanings and interpretations to existing terms.

I

General economic geography is an abstraction; reality only exists in its

[1] Robert E. McNee: "The Changing Relationships of Economics and Economic Geography," *Econ. Geog.*, Vol. 35, 1959, pp. 189–198; H. H. McCarty: "Toward a More General Economic Geography," *Econ. Geog.*, Vol. 35, 1959, pp. 283–289.

[2] H. H. McCarty: "An Approach to a Theory of Economic Geography," *Econ. Geog.*, Vol. 30, 1954, p. 98.

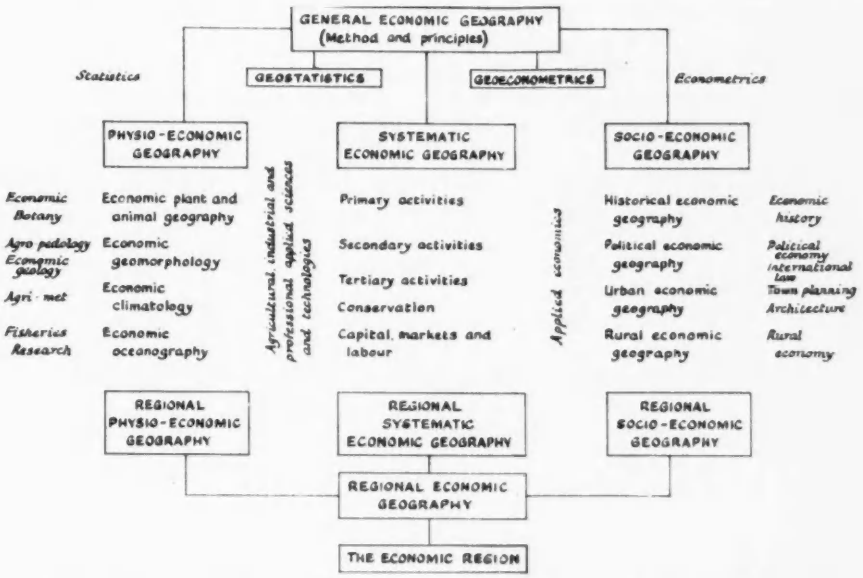

FIG. 1. A framework for economic geography. The box headings refer to the main structure, the lower case titles to its subdivisions, and the italics to other disciplines to which these subdivisions are related. Only the more obvious and the most direct of these relationships are here depicted.

parts. The basis of general economic geography lies in principles and methods, for which the keystone is a proper understanding of the history of the development of economic geography. To be effective, this history must be written by trained economic geographers. Only in this manner may economic geography the more easily absorb past and present contributions to discussions concerning the aims, scope, and methods of the subject.

Principles and methods may be divided into those which are general to economic geography as a whole, and those particular to each of its subbranches. General methods concern statistics and econometrics, or, more exactly, *geo*statistics and *geo*-econometrics. Economic geographers have for long been aware of the importance of statistics, and, in their portrayal of data by cartographic, diagrammatic, and tabular means, have developed many specific geostatistical techniques. Other branches of geography have developed similar special techniques, geomorphology and climatology for example, and it is perhaps time that some thought was given to the need to redefine the field of mathematical geography, the one branch of the subject whose scope has remained substantially unchanged since Ptolomaic times. A grouping of all geostatistical techniques employed by geographers under the heading of mathematical geography would do a great deal to focus attention upon the common interest of all branches of geography in statistical and mathematical methods of description and analysis. Geostatistics gives precision to methods, logic to forms of analysis, and quantitative values to conclusions. Geoeconometrics, stemming from econometric studies of socio-economic dis-

tributions in space, by stimulating theoretical and empirical studies by geographers of space relations, has done much to encourage the formulation of generalizations and to provide new insight into age-old problems.[3]

General economic geography proper is, therefore, concerned with methods and principles common to its parts. Because of its abstract quality it is justifiable to speak of it as representing the theoretical branch of the subject. Applied economic geography, because it deals more directly with terrestrial realities, is best conceived in relation to specific points of view. Broadly these may be classified under three heads: the *geo*centric, the *anthropo*centric and the *econo*centric viewpoints. Each viewpoint may be given a precise classificatory heading.

Physio-economic geography represents the *geocentric* viewpoint, and, in contradistinction to views expressed elsewhere,[4] is a meaningful aspect of the study of economic geography.[5] As a consequence of its particular approach, its subdivisions are comparable to the branches of physical geography. *Socio*-economic geography, on the other hand, personifies the *anthropocentric* standpoint, and its structure is analogous to that of human geography. Consequently, socio- and physio-economic geography are to economic geography as human and physical geography are to geography itself.

The significance of these two aspects of economic geography is manifold, but the importance of a two-way relationship must be stressed. Physio-economic geography, for example, is not simply a study of the influences of the physical environment upon economic activity, for it is equally a part of its function to observe the effect which economic activity has upon the physical environment. Similarly, in socio-economic geography, concepts formulated by economic geographers have already contributed a great deal: for example, in *urban* economic geography.[6]

Historical economic geography is of particular importance to the development of economic geography. Historical geography, as H. C. Darby remarked, is a foundation "meant for greater things to be built on."[7] The techniques of economic geography are of considerable importance to evolutionary and time cross-section studies in economic geography. Contemporary studies cannot ignore the past, and the incorporation of an historical base gives to economic geography an element without which no discipline can ever be complete.

The third subdivision, *systematic* economic geography, because it classifies the *econocentric* outlook, is particular to economic geography. Its subdivisions, corresponding to a functional classification of economic activity, are therefore the core areas of applied economic geography. Nevertheless, it can not be separated from either physio or socio-economic geography; and to assume, as even some economic geographers have done, that systematic economic geography is the whole of economic geography is to mislead. Yet well-known specialist library classifications, for ex-

[3] See, for example, W. L. Garrison, Brian J. L. Berry, et al.: *Studies of Highway Development and Geographic Change*, University of Washington Press, 1959.

[4] S. W. Wooldridge and W. G. East: *The Spirit and Purpose of Geography*, Hutchinson, London, 1951, p. 108, et seq.

[5] The author subscribes to the views expressed by A. F. Martin in his "The Necessity for Determinism," *Trans. Inst. Brit. Geogrs.*, No. 17, 1951, pp. 1–11

[6] Raymond E. Murphy and J. E. Vance, Jr.: "Delimiting the CBD," *Econ. Geog.*, Vol. 30, 1954, pp. 189–222; Brian J. L. Berry and W. L. Garrison: "A Note on the Central Place Theory and the Range of a Good," *Econ. Geog.*, Vol. 34, 1958, pp. 304–311.

[7] H. C. Darby: "On the Relations of Geography and History," *Trans. Inst. Brit. Geogrs.*, No. 19, 1953, p. 11.

ample, continue to restrict economic geography to little more than this.[8]

There are thus three divisions within the field of applied economic geography and each division is further subdivided. Reintegration can only be achieved through the region. Hence, as the diagram shows, each of the three branches is linked to regional studies of a type particular to its central viewpoint. Regional economic geography, like general economic geography, is concerned with methods and principles. The realities correspond to regions derived from applied general economic geography and culminate in *The Economic Region*, which for economic geography fulfills the same role as does *The Geographic Region* for geography as a whole.

II

The relations of economic geography only appear to be complex in the absence of orderliness. Within economic geography itself, relations are effectively osmotic; the various cells or compartments within the subject are so constructed, or should be so constructed, that a constant stream of material passes into and out of the subdivisions carried on a plasma of methods and principles. The relations of economic geography to the rest of geography are very similar, but here movement can be hindered because of a lack of an intermediary process of digestion. For economic geography, the existence of physio- and socio-economic geography provide one way of overcoming this difficulty.

The relations of economic geography to all other disciplines are of a third order and in principle are endosmotic rather than exosmotic. This is an important qualification, because so far as economic geography is concerned, the exosmotic ideal presupposes not only a utilitarian role for economic geography, but all too frequently premature claims by geographers as to what are these utilities or relationships. The endosmotic viewpoint on the other hand stresses only that which is of utility to economic geography itself. When this is considered in relation to the disciplinary definition now proposed, it is immediately apparent that these endo-dynamic relations are mainly of one kind—to the applied arts, sciences, and technologies. The more important of these have been sketched in.

CONCLUSION

This disciplinary definition is essentially conservative and therefore professional economic geographers should have no difficulty in classifying works and materials already known to them according to this scheme. As an essay in geographical taxology it will have served its purpose if, as a result of classification, avenues for future work might become more apparent.

ACKNOWLEDGMENT

The author is indebted to Miss Elspeth Buxton, Assistant Librarian to the School of Geography, Oxford, for pointing out some of the finer points of library classification.

[8] For example, S. W. Boggs: "Library Classification and Cataloguing of Geographic Materials," *Annals Assn. Amer. Geogrs.*, Vol. 27, 1937, pp. 49–93.

CHILE'S NEW IRON AND STEEL INDUSTRY

C. Langdon White and Ronald H. Chilcote

Dr. White, Professor of Geography at Stanford University, has brought together in this article his special fields of interest: South America and the geography of the iron and steel industry. Mr. Chilcote, a candidate for the Ph.D. in Hispanic American Studies at Stanford, studied the Chilean steel industry in the field in the summer of 1957.

DURING the past decade a small and insignificant steel industry has been formed into an efficient modern enterprise, capable of supplying Chile's basic steel requirements. This enterprise, known as Compañia de Acero del Pacífico (CAP), is the second-largest integrated iron and steel plant in South America.[1] Since its inception in November, 1950, CAP has played a significant role as the "proudest accomplishment" in Chile's rapid industrial development. CAP's formation was based upon the principle that the steel industry forms the fundamental base of the industrialization of a country and that steel production measures the degree of material progress of a nation. However, Chile's emphasis upon heavy industry is so great there has developed a condition of serious imbalance, a condition which has been aggravated by continuous inflation. Agriculture, the productive partner of industry, has lagged behind and food production has not met the needs of a constantly increasing population.[2]

Four goals signified the benefits envisioned in the establishment of an iron and steel industry in Chile:

1. Elevation of the national level of living. New jobs, expanded markets, and increased economic stability were to help establish the moderating influence of a large middle class that has been lacking both in economics and politics.
2. Elimination of shortages of steel products caused during times of emergency—wars, depressions, etc.
3. Stimulation of new domestic secondary steel industries through a steady and economical supply of steel and steel products and dispersion of Chilean industry to areas outside Santiago.[3]
4. Reduction of heavy payments for importing steel and less national economic dependence on key mineral exports—copper, iron ore, and nitrates. In short, diversification of the economy.

The above goals represent a program perhaps advocated by the peoples of all

[1] U. S. Department of the Interior, Bureau of Mines, *Mineral Trade Notes*, Vol. 49, No. 4, October 1959, p. 23. Brazil's Volta Redonda is the largest integrated iron and steel mill in South America. Other national steel enterprises are located in Argentina, Colombia, and Peru, and another is nearing completion in Venezuela. An integrated steel plant is one whose facilities cover the whole gamut of steel-making operations from the mining and quarrying of raw materials to the manufacture of finished products.

[2] Since 1940, Chile's population has increased at a rate of about 1.7 per cent per year, whereas per capita production of food has increased by only 0.6 per cent per year. The gap between rising food consumption and domestic production has been filled by imports.

[3] It is estimated that 20 per cent of Chile's population and 54 per cent of its industry are located in the Santiago area.

underdeveloped countries who have existed in the past under miserable conditions. These peoples once accepted the brutal fact that nothing could be done to better their plight. They have been dominated by agriculture, but they desire to switch from agrarianism to industrialism as their means of achieving progress and a better way of life; whether economic or not, this determination to industrialize has focused upon the iron and steel industry.

Chile is one of the few Latin American countries which has both coal and iron ore, and which, therefore, is in a position, possibly, to engage in profitable iron and steel making. Because so much capital is needed to construct an integrated iron and steel plant, the greatest care had to be given to its location. Raw materials, markets, transportation, access to power and to water, personnel and technical facilities, and capital are the chief considerations in the establishment of a prosperous integrated metallurgical industry; political and social conditions may also signify the difference between success and failure.

Chile's integrated steel mill (named *Huachipato*) is located on San Vicente Bay near Concepción, two miles south of the port of Talcahuano (Fig. 1). Concepción, a growing center of Chile, ranks third in industrial development and has a disproportionate share of the country's new large industries; Santiago, Chile's capital, is located 360 miles by rail to the north. Several advantages make the Huachipato plant a preferred locale:

1. Its tidewater location on San Vicente Bay is sheltered and deep and this is important since the iron ore must be delivered some 500 miles by vessel from the north (Fig. 2).

2. The coal mines of Lota and

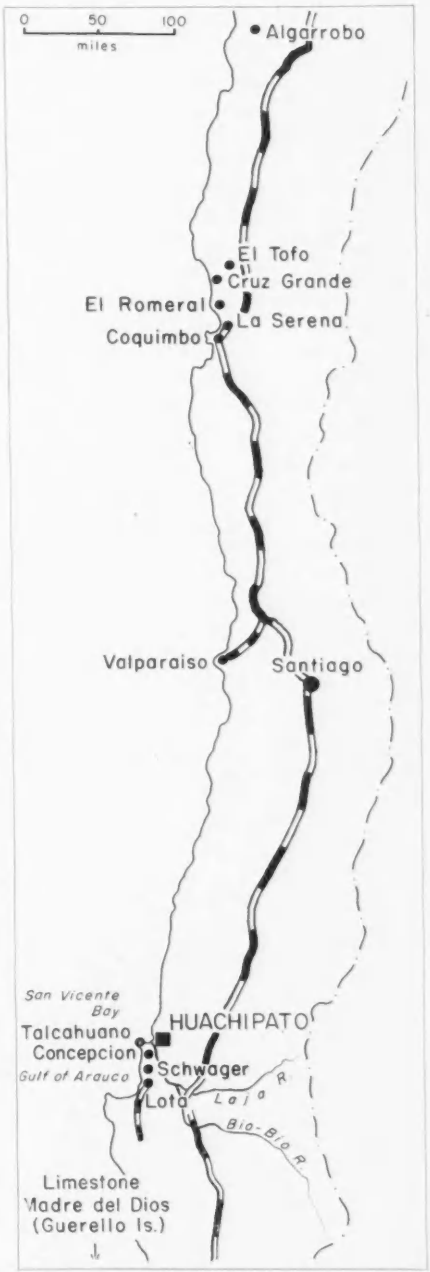

FIG. 1. Huachipato in relation to sources of raw materials for the blast furnace (iron ore, coal, limestone) and domestic market. (Courtesy Joseph E. Williams and Mary Frater.)

Schwager are located 25 miles south of San Vicente; rail and water transportation are available to San Vicente.

3. Hydroelectric power is obtainable from the Abanico hydroelectric plant located on the Río Laja.

4. Fresh water is provided by the near-by Río Bío-Bío.

5. Highway and railroad transportation is satisfactory.

6. Because of the proximity of large cities such as Concepción, Lota, and Talcahuano, there is an ample supply of labor.

7. The land is flat, which favors heavy industry.

8. The climate is stimulating. Concepción, though usually classified as Mediterranean Subtropical, might well be regarded as transitional between this climate and the Temperate Marine to the south.

The Huachipato plant, however, lies in a great earthquake belt. In fact, Concepción was destroyed by earthquakes in 1570, 1730, and 1751 and had to be almost completely rebuilt following the earthquake of 1939. The iron and steel plant was constructed with earthquakes in mind. In the 1960 earthquake, worst in Chile's entire history, the Huachipato plant escaped with minor damage and was operating within a few weeks after a replacement of minor parts of equipment.

RAW MATERIALS

Iron ore for this plant comes from the El Romeral mine located 17 miles northeast of La Serena. This mine is a joint venture of CAP and the Bethlehem Chile Iron Mines Company. Reserves are estimated to last 20 years; the ore assays about 60.5 per cent iron. A

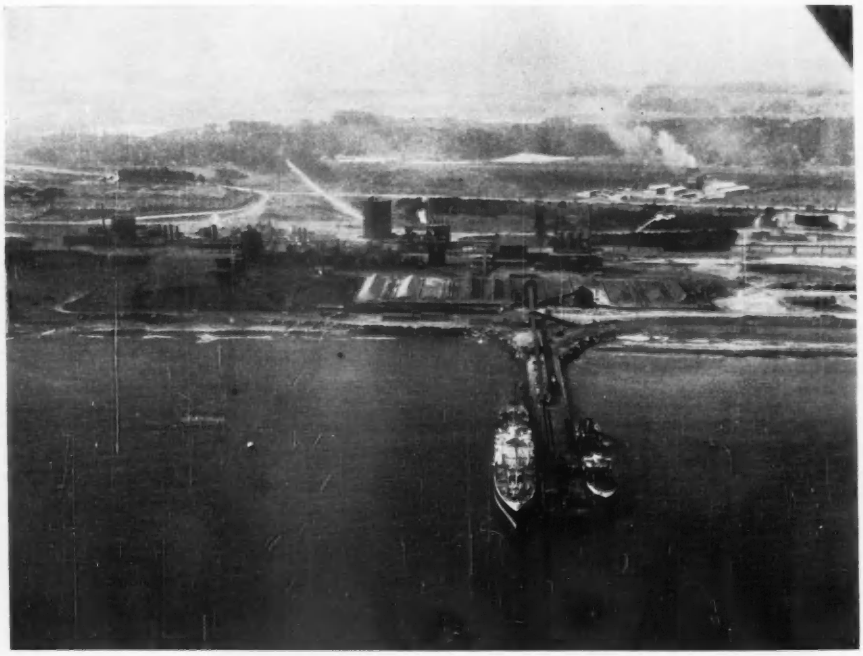

FIG. 2. Huachipato from the Pacific side. (Courtesy Foto Arte.)

specially-built company railroad, 22.5 miles long, transports the ore from the open-pit mine to the harbor of Guayacan Bay where the ore is loaded on ships and transported south to San Vicente. Another large deposit of similar ore content exists at the El Algarrobo mine (owned by CAP). This deposit has known reserves of 50 million tons with additional probable reserves of 75 million tons and is expected to be able to supply ore for two blast furnaces for 50 years.

Chile ranks third among South American countries in iron ore production, behind Brazil and Venezuela. Iron ore production in 1958 totalled 3,758,815 tons, of which 3,081,300 tons were exported. Total iron ore reserves are estimated at 190,000,000 tons of direct shipping ores and 500,000,000 tons of ores needing beneficiation.[4]

CAP purchases only a small quantity of scrap, about 2000 to 3000 tons per year. There is almost enough plant-produced scrap available for production of steel. During the period July, 1958, to June, 1959, consumption of iron ore at Huachipato amounted to 508,093 tons.

Most of the coal used at the plant (65 per cent) is mined at near-by Lota and Schwager and transported by rail 25 miles to Huachipato. Most of the remaining 35 per cent is imported from the United States. The Chilean fuel has low sulfur and ash content and is easy to wash but suffers from two disadvantages: first, its coking power is weak, and it requires the addition of low volatile coal (which has not been found in Chile and must be imported); secondly, of the nine veins comprising the deposits, only four are workable, and they are located in underground mines stretching two to four miles from the coast of the Gulf of Arauco; thus operating costs are high.

Aggregate Chilean coal reserves have been very conservatively estimated at some 260 million tons, of which 55 per cent is composed of coking coals. There are also 4000 million tons ranging from sub-bituminous to lignite which are unsuitable for the iron and steel industry.[5] In 1958–1959 CAP consumed 249,727 tons of domestic coal and 130,891 tons of imported coal.

Limestone of excellent quality is quarried on Guarello Island in the archipelago of Madre de Dios, 950 miles to the south. The quarry on this island was developed and is operated by CAP.

Dolomite in Chile has a high percentage of silica and the product of the El Maule quarry, owned and operated by CAP, is suitable only as a blast furnace flux. Open-hearth requirements of low silica dolomite are imported from Uruguay. Large quantities of manganese with an average ore content of 46 per cent are found in the province of Coquimbo.

WATER AND HYDROELECTRIC POWER

The water requirements of the CAP plant are about 30 million gallons per day.[6] The most suitable source is the Río Bío-Bío, five miles to the south. This river is very wide and has an unstable bed of quicksand, and an enormous quantity of sand is carried in suspension and rolled by the current. A pumping station screens out this sand and carries the water to Huachipato.

Sufficient hydroelectric power is avail-

[4] U. S. Bureau of Mines, *Mineral Trade Notes*, Vol. 46, No. 2, August 1959, p. 18.

[5] United Nations, *A Study of the Iron and Steel Industry in Latin America*, Vol. 1, New York, 1954, p. 25.

[6] Ross Nebolsine, "Water Supply for Steel Plants," *Iron and Steel Engineer*, Vol. 31, April, 1954, p. 81. Some plants use as much as 65,000 gallons of water to make a single ton of finished steel. Roughly 2 per cent of this amount is not reused.

able from the Abanico plant, located on the Río Laja, which flows westward from the Andes.

TRANSPORTATION AND CHILE'S MARKET FOR STEEL

In the iron and steel industry transport is basic at every stage from the assembly of raw materials to the distribution of fabricated products. In Chile's metallurgical industry, water rather than land transportation is employed. CAP's vessels bring iron ore from the north to San Vicente and return with coal from the Lota and Schwager mines. CAP's trains operate over the state railway system and transport coal from Lota to Huachipato. Limestone moves north by ship from Guarello Island. A railway system is available connecting the key points of Valparaiso and Santiago with Concepción, Lota, and Talcahuano.

A 1956 market survey indicated a potential annual domestic consumption of 360,000 tons of steel by 1960 or approximately 145 pounds per capita. Metalworking establishments increased from 126 in 1945 to 309 in 1955.

The Huachipato industrial zone constitutes an important factor in the expansion of the market for steel and miscellaneous by-products. Many new plants are in operation or under construction; included are producers of wire, pipe, metal structures, grinding balls, zinc and tin scrap refining, lime, cement, and chemicals.

CAP's policy has been to maintain a certain percentage of foreign market sales in order to stabilize a cyclical and often unstable domestic demand. In 1958–1959, 63,291 tons of steel products were exported to Argentina. This amount was about 77.8 per cent of total steel exports.

DEVELOPMENT OF CAP: CAPITAL, TECHNICAL FACILITIES, AND TECHNICAL ASSISTANCE

In 1939 a Chilean government agency, the Corporacíon de Fomento de la Producción (CORFO), was organized to promote industrial development. One of its objectives was to solve Chile's steel problem. After it was verified that there existed in Chile sufficient raw materials, electric power, and transportation facilities to warrant the establishment of an integrated steel industry at San Vicente, CORFO presented its proposals to the Export-Import Bank in Washington, D. C. In September, 1945, this bank approved a loan of $28 million to finance the first segment of the project which cost $60 million. A loan of $10 million was also secured from the Central Bank of Chile, and capital of $15 million was subscribed, 38 per cent by CORFO and 53 per cent by private investors.

Studies of coal samples indicated that the quality of Chilean coal would produce a satisfactory metallurgical coke to operate a blast furnace, and it was concluded that the blast furnace process offered economical and technical advantages over the electric furnace.

In accordance with one of the credit conditions imposed by the Export-Import Bank, CAP secured the services of the Koppers Company, Inc., of Pittsburgh to supervise the construction and operation of the plant. Construction was completed by June, 1950, and the plant was inaugurated in November, 1950. Facilities included a blast furnace, a battery of 57 coke ovens, a Bessemer converter, two open-hearth furnaces, a plate sheet tin mill, merchant mill, and blooming mill.

After operations were fully established, it became evident that steel production facilities were inadequate to

process all the excess production of the blast furnace. An expansion program, completed in 1954, included 13 additional coke ovens, sintering facilities, a second Bessemer converter, a third open-hearth furnace and a hot metal mixer, and increased facilities for the manufacture of sheets and tin plate.

In 1956 an increased demand for flat products necessitated the provision of additional plant facilities of newer design, greater capacity, and better yields. Much of the equipment had become obsolete and was not competitive with modern rolling systems. Phase one of the modernization program provided for the improvement of the plant's hot rolling facilities which, according to company reports, resulted in substantial reduction of costs and increased output of finished steel products. Phase two of the improvement program, completed by the end of 1959, included the purchase of a continuous pickler, a continuous cold reducing mill, a cleaning line, coil annealing furnaces, a temper mill, additional plate-producing facilities, and the addition of a fourth open-hearth furnace of 200-ton capacity. The completion of this program was to place CAP in a position to produce 430,000 tons of steel ingots and 330,000 tons of finished products at an expected lower cost of $12 per ton.[7] Total expenditures by CAP at this writing are $77 million in the initial investment and $76 million in improvements, or a total of $153 million. Of this amount the Export-Import Bank credits totalled $80.3 million and the remainder was financed by local investment and loans.

Plans for the period 1959 to 1964 provide for the installation of a second blast furnace and facilities to increase production capacity to 650,000 tons of steel ingots.

In the early stages of its operation CAP had 140 American technicians under contract in supervisory, advisory, and training positions. As Chilean engineers and workmen acquired the necessary degree of efficiency the number of foreign engineers was reduced to 28 who today remain in an advisory capacity.

Complete responsibility for the management and operation of CAP has been invested in Chilean personnel. Personnel is segregated into "workmen" and "employees." In June, 1959, there were 4121 workers and 1460 employees. The high rate of efficiency in operations has been attributed to the combination of American willingness to teach and of Chilean desire and ability to acquire the necessary knowledge and skills. Chilean labor is regarded as among the best in all Latin America. Wages are much lower in Chile than in Western Europe and the United States.

Has the establishment of such a basic industry as CAP met the minimum standards of efficiency or has it enslaved the economy which it sought to liberate? Should a semideveloped country such as Chile develop its own iron and steel industry? It is necessary to examine the foundations of this steel industry to ascertain whether it can compete with foreign suppliers within its own market, in quality, quantity, price, and value.

The combination of improved equipment and facilities, technical assistance, and domestic consumption of adequate raw materials has made CAP products comparable in quality with similar foreign products. One hundred per cent of Chile's basic internal steel needs are now met by the domestic industry; 30 per cent of CAP production is exported.

[7] J. Zapata, "Compañía de Acero del Pacífico Chile, Its Inception and Growth," *Iron and Steel Engineer*, Vol. 36, April, 1959, p. 114. Compare this capacity with that of Sparrows Point (8,200,000 annual ingot tons), which is the largest plant in the United States.

However, as was pointed out earlier, Argentina received 77.8 per cent of the exports; this foreign demand is expected to slacken shortly now that Argentina's San Nicolás plant with 500,000 tons capacity is completed.[8] If CAP is to maintain steady year-to-year production growth, it must depend upon foreign buyers. During 1957–1958 domestic demand and consumption dropped because of strikes and general economic conditions; thus 54 per cent of finished steel products went to foreign markets, but total profits dropped from $5,446,920 in 1956–1957 to $1,663,370. Some of this loss in profit was reflected in transportation costs and some in the strike provoked in June, 1958.

We must ask the question of whether Chilean steel is competitive with foreign steel? CAP sells its products in the domestic market at prices that are about 20 per cent lower than the average prices (including a protective tariff) of equivalent imported products, but not at prices that are lower than basic cost.[9] CAP officials have stated that their price policy aspires to eliminate the need for tariff protection when the program of modernization and expansion is completed.

In terms of annual value of production and over-all industrial development which followed the establishment of the Huachipato plant, CAP must be considered as the most important Chilean industry in recent years. This development has brought several immediate benefits to Chile. Existing and later established industries were furnished with a normal supply of steel which enabled them to expand and diversify their production. Also one-time unexploited resources are now being utilized. CAP has meant increased national income for Chile's economy. Its effects on the balance of payments, through savings in foreign exchange, have been considerable.

For sound economic growth, underdeveloped countries need balanced development of all sectors of their economy. Too much emphasis on industrialization alone can boomerang and harm over-all development. Investment capital should go into those enterprises where it will be most productive. Several Latin American countries moved too rapidly in their effort to industrialize. Brazil spent $1 billion more than the total amount of her foreign exchange for industrial equipment. Her economy became lopsided, heavy on industrialization, light on agriculture. Colombia's Paz del Rio plant lacked capital in its initial construction and later failed to meet its demand for steel.[10] Peru's market is considered too limited and production costs too high to justify an integrated steel plant.[11]

The Huachipato steel mill rests on a comparatively firm geographic and economic base. One engineer recently commented on the growth of Huachipato:

> Here was a plant built with a minimum of expense where man could easily operate at capacity and, hence, at a considerable profit because it could not fill the demand. [This statement of demand refers to the early days of the plant's existence.] Here the planning was truly for the future to suit the existing abilities and needs of a country that eventually wanted to control its source of steel. . . . There must have

[8] Chase Manhattan Bank, *Latin American Business Highlights*, 2nd quarter, 1959, p. 11.

[9] Compañía de Acero del Pacífico, *Memoria Anual*, 1958–1959, p. 11. Steel imported into Chile after payment of ocean freight, duties, insurance, and miscellaneous taxes costs approximately 75 per cent more than the price FAS, New York.

[10] C. Langdon White and Donald J. Alderson, "Steel and Symbolism at Paz del Rio," *Inter-American Economic Affairs*, Vol. 9, Spring, 1956, pp. 82–94.

[11] C. Langdon White and Gary Chenkin, "Peru Moves onto the Iron and Steel Map of the Western Hemisphere," *Journal of Inter-American Studies*, Vol. 1, July, 1959, pp. 377–386.

FIG. 3. The Huachipato iron and steel complex—second most important metallurgical center in South America. (Courtesy Foto Arte.)

been a great temptation to build a far different plant—a plant that could have produced three times as much iron and steel from a variety of high production units. None of these units would have been profitable because each would have operated at only a fraction of capacity (Fig. 3).[12]

Because Chile's over-all economic problems are so very complex, industrialization is not the sole solution for her ills. It is sometimes true that trained personnel, capital, and other resources, which might be more likely to promote over-all development, are directed to industry. In 1928 Chile was roughly self-sufficient in food supplies. In 1958 she imported 25 per cent of those requirements. Chile's agricultural needs change; her antiquated hacienda agrarian system must be brought into the twentieth century if the standard of living of a large part of the population is to be raised.

It is perhaps true that Chilean leaders desire an advanced economy based on large-scale manufacturing with power tools, large capital investment, and sophisticated organization; the iron and steel industry forms a part of such an ideal. What might be argued is that one way to increase over-all development and achieve a balance between industry and agriculture is to develop industrialization sufficiently to provide the necessary implements and technological support for farming. Such a modest feedback between industry and agriculture is a quite logical solution to economic development.

The iron and steel industry also has a symbolic role to play in Chilean life. It not only serves as a conveyance for non-economic aspirations such as independence and social progress, but it reflects national strength and maturity.

Compañía de Acero del Pacífico has proved itself to be an asset to Chile's development. Chileans need not look only at the symbolic role of their iron and steel industry; they may feel justly proud of its economic performance. A decade of successful operation has helped to diminish many of the doubts and much of the skepticism of critics. The chief counters in the arithmetic of iron and steel—raw materials, transportation, markets, technical facilities, personnel, and capital—have summed up success for Huachipato and a valuable contribution to Chile's progress.

[12] Zapata, *loc. cit.*, p. 116. Comment by R. Tietig, Jr., Principal Engineer, Steel Plant Development, Kaiser Engineers.

METROPOLITAN AREAS—A REVIEW OF THREE RECENT PUBLICATIONS*

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I

The World's Metropolitan Areas is the title of a small book by International Urban Research of the Institute of International Studies, Universities of California (Berkeley).[1] The editor and director is Kingsley Davis, but other members of the staff who participated in this study are Suzanne R. Angelucci, Harley L. Browning, Richard L. Forstall, Jack P. Gibbs, Gene B. Petersen, and Thomas O. Wilkinson. The present volume represents the results of part of a five-year research program by IUR which was supported by the Ford Foundation.

This book provides a list of the metropolitan areas of the world with their total populations, and includes area definitions for most of them. It also analyzes the problems of delimiting areas and describes the procedures followed by the staff in defining the metropolitan areas listed.

Much careful study evidently has gone into this work and the results have real value for comparative urban research.

The lack of any standard for comparing statistics for cities around the world has discouraged serious quantitative urban comparisons. Now these standard definitions are available although improvements in them can and should be made as increasing census information about the areas becomes available. The great cities are growing everywhere and becoming more important segments of the world population, yet the basic facts about these cities on a basis permitting reasonably accurate comparisons are not available. The service of providing us with comparable definitions should be appreciated, but this must be on a continuing basis, much as the Standard Metropolitan Statistical Areas are defined in the United States, if it is to be of more than momentary value. Also, it would be highly desirable to have much basic statistical information presented for each area, as the task of consulting hundreds of reference sources in many different languages is almost an insurmountable barrier for most researchers. The text indicates a hope to publish additional information later. This most certainly should be done, and the definitions should be reviewed and revised, if necessary, at intervals of not more than ten years and preferably more often.

The main discussion provided in the text of this book concerns "Urban Aggregates and Their Delimitation for International Comparison." It emphasizes that data on political cities fre-

*Any opinions expressed in this article are those of the author and do not necessarily reflect the position of the Bureau of the Census.

[1] University of California Press, Berkeley and Los Angeles, 1959.

quently lack comparability within countries as well as between countries. Cities are classified as underbounded, overbounded, and truebounded. Those of us familiar with large cities in the United States know that most of them fall in the underbounded class, but some are overbounded or represent a combination of underbounding and overbounding, and very few are truebounded. This is no less a problem elsewhere on the earth. Since the city itself is generally ill adapted as a unit for comparison, two major alternatives to delimitation are discussed: the urbanized area, or its equivalent, and the metropolitan area. IUR would have preferred to use the urbanized area, such as was developed by the United States Bureau of the Census, which IUR defines as "the territory settled continuously in an urban fashion," but the absence of any possibility of defining such areas on an international basis precluded this choice. Thus, the metropolitan area concept was chosen with the possibility of defining areas in terms of a political unit or an agglomerate of political units. They actually selected the Standard Metropolitan Area definition, with modifications to fit the international conditions, as the basis.

The major problem in applying this definition was to find the counterpart of the "central city" and the equivalent of the "county." IUR recognized that even in the United States perfect comparability between S.M.A. definitions was not achieved, because the political definition of cities and counties varied from one part of the country to another. Also, the difference in economic and technological status between the United States and some of the less developed countries and the absence of statistical information, such as is available in the United States, made certain changes inevitable.

The definition of Metropolitan Area (M.A.) adopted in this project for purposes of international comparison is as follows:

> "An area with 100,000 or more inhabitants, containing at least one city (or continuous urban area) with 50,000 or more inhabitants and those administrative divisions contiguous to the city (or to the continuous urban area) which meet certain requirements as to metropolitan character."

In applying this definition two or more cities that were physically adjacent were counted as a continuous urban area. Commuting and telephone data were absent in almost all countries so these S.M.A. criteria were not used. The S.M.A. criterion relating to the predominance of nonagricultural workers in surrounding areal units was applied so far as possible. It was modified to read that "Any administrative division which is considered a county equivalent must have, to be included in an M.A., at least 65 per cent of its labor force working in economic activities other than agriculture (which is meant here to include hunting and fishing as well as farming)." There were two types of exceptions to this rule. If an administrative division not meeting this requirement was completely surrounded by administrative divisions that did meet it, it was included. Secondly, an administrative division actually meeting the nonagricultural requirement might be excluded if it was too far from the principal city.

Where data on the industrial composition of the labor force were not available by administrative divisions, the criterion of population density was substituted. A relative standard of density was employed that varied from country to country, to a great extent because of different technological bases.

Where qualifying administrative divisions connected principal cities, the two M.A.'s were split on the basis of

a low point in either the industrial employment or population density gradient.

Data were simply not available for metropolitan delimitation in all countries. From an estimated total of 1046 M.A.'s in the world, 720 or 69 per cent were delimited. Communist countries account for 266 of the 326 cases of non-delimited M.A.'s and 230 of these 266 were in China and the U.S.S.R.

Tables list all of the Metropolitan Areas by continent by country. The stub gives the name of the Metropolitan Area and the principal city. Population is given for the last census before 1954 and estimated population for about 1955.

The appendix lists the component units (or definition) of each Metropolitan Area, with sources of data.

No analysis of the Metropolitan Areas shown in the tables accompanies the book. Hence, the reader may be interested in some tabulations which the author of this review made of the 98 Metropolitan Areas with 1,000,000 or more inhabitants (Table I). It should be remembered, however, that most of the Communist areas were included on the basis of city totals which may or may not represent the true Metropolitan Areas.

The New York–Northeastern New Jersey Metropolitan Area is the largest, followed by Tokyo-Yokohama and London, each over 10,000,000. The 12 leading Metropolitan Areas, all over 5,000,000, are ranked below with population estimated for about 1955.

TABLE I

METROPOLITAN AREAS OF THE WORLD WITH 1,000,000 OR MORE INHABITANTS

Size	*Number*
10,000,000 and over	3
5,000,000–9,999,999	9
2,500,000–4,999,999	15
1,000,000–2,499,999	71
	98

Distribution	*Number*
Europe	33
Asia	32
North America	18
South America	6
Africa	3
U.S.S.R.	2
Middle America	2
Oceania	2
	98

1. New York–Northeastern New Jersey	14,280,500
2. Tokyo-Yokohama	11,349,339
3. London	10,490,690
4. Moscow	7,300,000
5. Paris	6,736,836
6. Osaka-Kobe	6,404,749
7. Shanghai	6,204,417
8. Chicago	6,121,600
9. Buenos Aires	5,750,000
10. Calcutta	5,700,000
11. Los Angeles	5,640,000
12. Essen-Dortmund-Duisburg	5,353,100

II

In the fall of 1959 the Bureau of the Budget, Executive Office of the President, issued a small booklet on *Standard Metropolitan Statistical Areas*.[2] This includes an introductory statement on the purpose of the areas, the criteria followed in establishing them, and the titles and definitions of each of the 192 areas now recognized. The criteria include revisions of the Budget Bureau statement issued in March 1958 and of the original and much earlier Budget Bureau statement on Standard Metropolitan Area Definitions issued July 28, 1950. In 1950, only 172 areas were recognized.

The principal purpose of this review is to indicate what changes in criteria occurred between 1950 and 1959. The basic concept of the area has not changed, but there has been a loosening

[2] Superintendent of Documents, Government Printing Office, Washington 25, D. C.

of some of the restrictions of the 1950 criteria.[3]

First of all, it should be made clear that it is the Bureau of the Budget that has the responsibility for defining these areas. For the past ten years most writers, including the authors of the books reviewed in this article, have given authorship credit erroneously to the Bureau of the Census. This is partly understandable because the Census Bureau gave early leadership in defining these areas, has presented more data for them than any other statistical agency, and was responsible for developing the metropolitan district definitions over a long period in the past. In defining the *standard* areas the Budget Bureau has had the advice and assistance of a Federal Committee on which numerous agencies including the Census Bureau are represented, but the final word on criteria and their application has increasingly been spoken by the Budget Bureau.

For the convenience of the reader the changes are itemized below:

1. The most obvious change is the addition of the word "statistical" to the area names. The reason given for this change is "to describe more accurately the objective of the definitions." "The primary objective . . . was . . . to make it possible for Federal statistical agencies to utilize the same boundaries in publishing statistical data useful for analysing metropolitan problems."

The area definitions have come to have a wide public acceptance, and many uses not intended or foreseen by the participating agencies have developed. As a result, strong pressure is sometimes exerted to change criteria or to influence the interpretation of facts in the application of criteria to particular situations, which are usually represented by local partisans to be unique but which are rarely so. On the other hand, all the facts are not always available, and the criteria for defining metropolitan areas, although admirable, still leave something to be desired.

2. Another change in the criteria since 1950 is the recognition of small twin cities with a combined population of at least 50,000 as the nucleus of an S.M.S.A. The cities must have contiguous boundaries and constitute, "for general economic and social purposes, a single community." Also, the smaller must have at least 15,000 inhabitants. This change so far has only increased the number of S.M.S.A.'s by five, namely, Champaign-Urbana, Illinois; Fitchburg-Leominster, Massachusetts; Lewiston-Auburn, Maine; Muskegon–Muskegon Heights, Michigan; and Steubenville-Weirton, Ohio–West Virginia.

3. The criteria of metropolitan character have been tightened since 1950 by raising the qualifying percentage of nonagricultural workers in the labor force for an adjacent county from $66\frac{2}{3}$ per cent to 75 per cent. The greater restrictiveness in this criterion is more apparent than real because of the continued decline in numbers of agricultural workers.

4. Among the additional criteria of metropolitan character, it is now specified that the adjacent county must be either the place of employment or residence of 10,000 nonagricultural workers, or the number of nonagricultural workers employed in the county must equal at least 10 per cent of the number of nonagricultural workers employed in the county containing the large city in the area, or the number of nonagricultural workers living in the county must equal at least 10 per cent of the number of the nonagricultural workers living in

[3] See "The Definition of Standard Metropolitan Areas" by Robert C. Klove, *Econ. Geog.*, Vol. 28, 1952, pp. 95–104.

the county containing the largest city in the area. Thus, the above criteria are not only more explicit than they were in 1950, but make it possible for some counties to qualify that would not have qualified under the interpretation of the 1950 rules.

5. The special criterion of metropolitan character for definition of S.M.S.A.'s in the New England States, where the unit of definition is the town rather than the county, was loosened. A population density of only 100 persons per square mile is now required instead of 150.

6. The criteria of integration have not been changed except to emphasize commuting and to deemphasize telephone communication. The first was possible because more information on commuting was available as the result of many recent commuting surveys conducted by the various State employment services under the direction and with the financial support of the Bureau of Employment Security. Telephone data were little used because it was discovered that meaningful and comparable information could not always be procured from the telephone companies because of differences in areas covered and compilation methods used.

7. The criteria for titles have been changed in three ways:

1) to include the names of all cities with at least 250,000 inhabitants,
2) to include the name of the smaller second city qualifying under the so-called "twin city" rule, which in effect drops the smallest possible central city from 25,000 to 15,000, and
3) to add to the area titles in the case of multi-State areas the names of all States into which the area reaches.

8. Included with the list of S.M.S.A.'s and their area definitions are the names of all cities in each area that had 25,000 or more inhabitants in 1950 or in a special census since 1950. Also, the new areas and the changes in definition since 1950 are indicated. One error may be noted: Easton was part of the name of the Allentown-Bethlehem-Easton area in 1950.

9. At the end of the listing are the names and definitions of two areas called "Standard Consolidated Areas." These are the New York, New York–Northeastern New Jersey area and the Chicago, Illinois–Northwestern Indiana area.

When new commuting data became available, and in many instances this was the first time that comparable data of this nature were available, it was found that a considerable number of additional counties met the integration criteria and so they were added to the area definitions. In a few cases, counties that had been included did not meet the criteria and changes were required. Most of these changes were in the two largest S.M.A.'s. The former New York, New York–Northeastern New Jersey S.M.A. was divided into four S.M.S.A.'s—the New York, New York, S.M.S.A.; the Newark, New Jersey, S.M.S.A.; the Jersey City, New Jersey, S.M.S.A.; and the Paterson-Clifton-Passaic, New Jersey, S.M.S.A.—because the commuting data indicated that four major centers were involved. The Chicago, Illinois, S.M.A. was divided into the Chicago, Illinois, S.M.S.A. and the Gary-Hammond–East Chicago, Indiana, S.M.S.A. In the New York area two counties, Middlesex and Somerset, both in New Jersey, were found not to be sufficiently integrated on the basis of commuting to tie in with any of the adjoining S.M.S.A.'s. In the Chicago area, one county, McHenry, was added to the Chicago, Illinois,

S.M.S.A. and another county, Porter, was added to the Gary-Hammond–East Chicago, Indiana, S.M.S.A.

The above facts form the background for the recognition of the Standard Consolidated Areas. Middlesex and Somerset Counties in New Jersey are included in the definition of the New York, New York–Northeastern New Jersey Standard Consolidated Area although not in any S.M.S.A. No criteria for the definition of the Standard Consolidated Areas are provided and none exist except the general recognition that "more inclusive metropolitan statistics" for these two areas seem to be of special importance.

The commuting criterion which is involved requires that 15 per cent or more of the workers residing in a county commute to the county or counties containing the central cities of the area. This 15 per cent cut-off was originally based on *a priori* considerations. Perhaps too much importance is given to commuting or possibly commuting rates vary between large, medium, and small-sized metropolitan areas. Many counties that are primarily rural now have high commuting rates to cities that in the past would not have been considered as near. It is evident that much more thought needs to be given to the problem of integration criteria and also to just exactly what are the characteristics which make an area metropolitan and how far out does metropolitan character extend.

I believe great progress has been made in the last decade in understanding and defining metropolitan areas, but we are not yet clear in our thinking as to the essential characteristics of a metropolitan area. How should it differ from what has been defined as urbanized areas? The concept of the metropolitan region is far less well defined; indeed, many use the term loosely. Also, are some of the small areas (under 100,000) truly metropolitan? I doubt it, but I really don't know.

Actually there are many kinds of metropolitan areas in the United States as well as across the world and truly each one is unique. We have been trying to fit them all into a single standard mold, but that may be wrong. On the other hand no service would be done to the subject if each were considered unique and defined without reference to standard criteria. The system of Standard Metropolitan Statistical Areas represents a great advance in statistical reporting in the United States just as the work of Kingsley Davis and his colleagues represents a real contribution to the international reporting of Metropolitan Areas.

The 1960 Census will provide new data to help answer the question of redefining the S.M.S.A.'s. In particular, the place of work question related to the place of residence to be tabulated for the counties in and around each metropolitan central city will for the first time provide comparable data across the nation on the broad commuting patterns.

The 1960 Census also is recognizing new S.M.S.A.'s qualifying on the basis of these rules.

III

Metropolitanization of the United States by Jerome P. Pickard is Research Monograph 2 published by the Urban Land Institute of Washington, D. C., in 1959. This study also concerns the definition of metropolitan areas but does not make its major contribution in respect to this subject. It contains an analysis of the development of metropolitan areas in the United States over the past half century and a projection of their growth to the year 2000. To the reviewer the more stimulating part of the monograph is the latter part

which is concerned with the functions of metropolitan areas and the distinctions between them in functional emphasis.

Pickard has generally rejected the Standard Metropolitan Area definitions except in the New England States and some other individual cases and has defined his own areas in a way closely parallel to the old "metropolitan districts" developed by the Bureau of the Census in 1940 and earlier.

His major criteria are two:

> "(1) A total area population of 100,000 or more.
> "(2) Delimitation of the area to include the urban area."

The 100,000 minimum was also followed by Kingsley Davis and his group and is one that this reviewer heartily supports if the word "metropolitan" is to keep its significance. Whether 100,000 is the correct cut-off is another question, and the evidence on this point is yet to be assembled and analyzed.

The second criterion is not very specific, because the term "urban area" means different things to different people. In most cases Pickard used the 1940 Census metropolitan district with modifications to bring it up to date. He rejected the Census "urbanized area" as "too tightly drawn to really include the entire population area which is principally suburban or commuting in character." I believe his conclusion is correct that an "urbanized area" is not a metropolitan area, but a metropolitan area is also more than just "urban area." Why he felt it necessary to use revised metropolitan districts based on minor civil division units as his Metropolitan Areas rather than the Standard Metropolitan Areas is never really explained nor are the individual definitions of his Metropolitan Areas given. It must have been a very considerable task. As a matter of fact, he goes to the S.M.A. definition if the population of any Metropolitan Area defined by him is 95 per cent or more of the S.M.A. population. Then finally, when he analyzes the functions of Metropolitan Areas, he is forced to do it in terms of the Standard Metropolitan Areas, because statistics on functions such as manufacturing and trade are not available nor can they be made available for the areas he has defined.

Applying his definition Pickard found 150 Metropolitan Areas in the United States in 1956. Of these he called 69 Major Metropolitan Areas and these had 46 per cent of the United States population. The remaining 81 had only 8 per cent of the total population. Major Metropolitan Areas had populations of more than 250,000. The distinction between Metropolitan Areas on the basis of population size is a good one, because larger ones differ in complexity and character from smaller ones. Indeed, perhaps we should recognize a hierarchy of metropolitan areas classified on the basis of size, form, and function.

Pickard also developed a system of United States regions for the purpose of studying the distribution of Metropolitan Areas. These regions, whose limits follow county boundaries, "are based upon the size, spacing, and growth rates of the Metropolitan Areas included." A total of 10 are recognized in the United States of which three are metropolitan regions, namely the Atlantic Metropolitan, the Great Lakes–Midwest Metropolitan, and the California Metropolitan. "A metropolitan region is a region which has an overall population density of at least 100 persons per square mile, and 50 per cent or more of the total regional population located in Major Metropolitan Areas."

The growth of the Metropolitan Areas from 1910 to 1956 in number and size by regions is analyzed in tables, maps,

and text. The maps show the distribution of the Metropolitan Areas by different sized and shaded squares in a very satisfactory way. However, the United States base map was poorly chosen. The shoreline is too detailed for the map size, and the State names are barely legible and interfere with the readability of the map.

The metropolitan character of each of the regions is discussed. In addition to the three metropolitan regions are the other seven regions: Southeast, Floridian, Mid-Southwest, Mid-West, West, Southwest, and Northeast.

Then Pickard discusses the future growth in number and size of Metropolitan Areas. His population projections show 300 Metropolitan Areas by the year 2000. Growth will continue at a high rate in the three metropolitan regions, and the Floridian region will emerge as a new metropolitan region. He predicts the Southeast will have the largest number of Metropolitan Areas.

The 10 largest metropoli in the United States will be "super-metropolitan" areas and contain about one-third of the United States population. These super areas are in order: New York, Los Angeles, Chicago, Detroit, Chesapeake and Potomac, Delaware Valley, San Francisco Bay, Southeast Florida, New England, and Cuyahoga Valley. In population size Pickard predicts a range from 5 million to 23 million.

Pickard examined the working of the rank-size rule as applied to his Metropolitan Areas. In particular, he determined the largest Metropolitan Area (New York) to be 15,000,000 by applying the Zipf formula to the metropolitan areas at the bottom of the rank series. Of the first 17 Metropolitan Areas only the two largest, New York and Los Angeles, had actual populations (1956 estimates) below the expected theoretical populations.

In examining the population size order of Standard Metropolitan Areas by his regions, Pickard found that the California Metropolitan Region contains a higher order metropolis than is justified and concluded that Los Angeles is a super-regional metropolis serving the western half of the Nation. On the other hand, he found the Floridian, Southeast, Mid-Southwest, and West regions to be deficient in a metropolis of proper regional size.

The functional analysis of the Standard Metropolitan Areas is also made in terms of size order of Standard Metropolitan Areas or the rank-size concept. Six measurements of functional importance are used: manufacturing employment, bank deposits, Sunday newspaper circulation, wholesale trade employment, retail trade employment, and Federal government civilian employment. Maps show the distribution of Standard Metropolitan Areas by size order classes and by concentration for each function. A table accompanies each map showing the distribution of S.M.A.'s by regions.

In manufacturing employment Pickard found 94 areas of 2nd or higher order exceeding the 85 of 2nd or higher order in population. Of these, 14 have *concentration* of manufacturing (defined as a manufacturing size order 1.00 or more larger than the population size order of the area) and 42 areas have *specialization* (defined as a manufacturing size order of 0.50 and 0.99 larger than the population size order of the area). Most of the concentration and specialization areas are in the Metropolitan Region (a region combining the Atlantic Metropolitan and the Great Lakes–Midwest Metropolitan Regions) with a few in the Southeast and only one outside.

In financial activity based on bank deposits 70 S.M.A.'s are of 2nd or higher order, but only one is an area

of concentration—New York—and 12 rate specialization.

In Sunday newspaper circulation there are 90 areas of 2nd or higher order of which 18 have a concentration and 19 a specialization. The regional distribution of Sunday newspaper circulation areas with concentration and specialization is much wider than for manufacturing and financial activities.

In wholesale trade there are 50 areas of 3rd order or higher compared with 41 population areas. Many areas widely distributed are specialized, but only three concentration areas exist, all in the South—Charlotte, Dallas, and Atlanta. Two areas are deficient in wholesale trade, namely Washington and San Diego.

In retail trade there are 49 areas of 3rd or higher order. Evidence of the general dispersion of retail activity is the fact that there are no areas of concentration and only five of specialization. Only two have small deficiencies.

In Federal civilian employment there are 54 areas of 3rd order or higher. Of these 21 are concentrated and eight specialized. The distribution is uneven among the Metropolitan Areas as might be expected.

In his last chapter Pickard has developed a technique for studying combined metropolitan function. For each Metropolitan Area he has determined the deviation in size order for each function from the population size order and has added the average of the deviations to the population size order. His formulae give more weight to some deviations than to others. A final composite ranking of the 68 metropolitan areas of 2nd order or higher is given in a table. A map shows the distribution of the seven size orders.

Again a positive deviation of combined metropolitan function of more than 1.00 size order has been classified as "concentrated" in metropolitan function and a deviation of 0.50 to 0.99 as "specialized." Only one area is rated as concentrated, Des Moines, and 21 areas as specialized. Only 11 areas had negative deviations and only two had sizable deficiencies, San Diego and San Jose. Pickard points out that where Metropolitan Areas are close together specialization is limited to a few areas; in the West region where they are widely spaced all except Portland are specialized. Also, newer Metropolitan Areas of recent rapid growth lag in specialization.

By analyzing the functional deviations of the 30 larger metropolitan areas Pickard classifies some as diversified or at least relatively diversified (low in only one function). A table gives the various concentrations or specializations among the six functions of the 68 Major Metropolitan Areas by regions. Variations in functional emphasis between regions is evident. In all, the data provide for some interesting observations.

Appendices following the text provide details on definitions used, methods of population projection for regions and Metropolitan Areas, a size order calculation table, references, some tables on functions of the 68 Major Metropolitan Areas, and tables on Pickard's Metropolitan Areas and Standard Metropolitan Areas giving populations from 1910 to 1950, estimated 1956 population, and projected populations for 1960, 1980, and 2000.

This is not an easy book to read for it is packed with so many statistics. On the other hand, it is well illustrated with maps and graphs that emphasize the important statistics. Its novel approach to the functional significance of metropolitan areas, its population projections, and its emphasis on regional analysis of metropolitanization make it a valuable contribution to the literature on metropolitan areas.

BOOK REVIEWS

Readings in Urban Geography. Edited by HAROLD M. MAYER and CLYDE F. KOHN. viii and 625 pp.; maps, diagrs., tables, indexes. University of Chicago Press, Chicago, Illinois, 1959. $8.50. 9¾ x 7 inches.

Teachers of urban geography have long bemoaned the lack of an adequate textbook, and they have conducted their courses, with varying degrees of resignation, by using reading lists. Two of the nation's leading practitioners in the field have now rendered a useful service by culling their reading lists and compiling a selection of readings in urban geography. Although this volume is intended only as a stopgap, until a suitable textbook is written, it will undoubtedly receive wide adoption as a textbook.

It would be unfortunate if the availability of a stopgap serves to delay the appearance or to influence the character of the long-awaited textbook (or books), for students of urban problems in all the social sciences, and not in geography alone, are waiting for a clear and unified exposition of urban geography. On the other hand, the availability of this volume might well stimulate new course offerings in urban geography at institutions where the lack of a textbook has heretofore been a major obstacle.

Each of the individual articles in the volume is merely reprinted "by permission of the author(s) and the editor (or publisher)," and thus it is inappropriate to comment on their quality. Any critical evaluation must be restricted to the editorial process of selection and reproduction, or to comments on the present status of urban geography as revealed by the kinds of material from which the editors could select.

From the point of view of a professional geographer, it is gratifying to find that at least two-thirds of the contributors are geographers—and perhaps more, but the editors have not adequately identified them—and that half of the material is taken from geographical journals. Consequently, it is unusually distressing to have to report that the standard of map reproduction is not high, although all maps are readable.

The volume is topical, rather than "regional." Individual cities are considered only as the various authors use them to illustrate specific points, and no selection attempts to present a "complete" urban geography of any one city. This observer, at least, wholeheartedly approves of the topical approach, with emphasis on generic principles rather than on specific instances.

One could also vigorously defend a policy of restricting selection to the wealth of material available in the United States on the urban geography of the United States, if such a policy were rigidly adhered to. Unhappily, a single brief selection from an English journal published in 1937 seems almost a gratuitous insult to the fine work of English urban geographers and planners in the subsequent quarter century of wartime destruction and postwar reconstruction.

But what does this careful selection of published material tell about the current status of research in urban geography in the United States? Geographers are responsible for all the articles on urban classification, central place theory, transportation, ports, and water supply, and hence it might be assumed that we are holding our own in these aspects of the study of urban problems. Geographers are fairly well represented among the authors of articles on urban population, city size and spacing, and the urban economic base, and totalled at least half of the authors of articles on the growth of cities, the urban fringe, and blight and renewal.

It is rather surprising, however, to find so few geographers among the authors of articles on the structure—general, commercial, industrial, and residential—of cities, perhaps because urban geographers have tended to study individual cities rather than the general principles of city structure. But it is more surprising, and much harder to understand, why two of the three articles on urban land-use survey and mapping techniques are written by non-geographers.

On the basis of this volume, American urban geographers appear strongly oriented toward the economic aspects of urban life, and possibly pay too little attention to the physical and social aspects. The physical environment, for instance, is hardly mentioned except in the article on urban water supply, and the editors comment on the lack of articles classifying types of urban sites. They also mention the lack of geographic studies of cities as centers of cultural diffusion, and might equally well have cited the need for more investigation of the internal distribution of demographic characteristics within urban areas.

Completely apart from the light it throws on the strong points and weaknesses of current research trends in urban geography in the United States, this collection of readings will

prove extremely useful to the teacher of urban geography. It will be widely adopted as a textbook, and it will provide useful supplemental reading material even after the long awaited systematic textbook in urban geography has appeared.

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Géographie de la Population, by JACQUELINE BEAUJEU-GARNIER. 2 vols., 435 and 574 pp.; maps, diagrs., ills., tables, index. Éditions Génin, Librairie de Médicis, Paris, 1956 and 1958. 6,600 fr. 10 x 6½ inches.

Population; Mouvements, Structures, Répartition, by GERMAINE VEYRET-VERNER. 266 pp.; diagrs., bibliogr. B. Arthaud, Paris, 1959. 8¼ x 6 inches.

Die Bevölkerung der Erde; Verteilung und Dynamik, by KURT WITTHAUER. Ergänzungs-Heft 265 zu Petermanns Geographischen Mitteilungen. 336 pp.; maps, tables, diagrs., bibliogr. Hermann Haack, Gotha, 1958. 28.80 DM. 10½ x 7½ inches.

Questions de Géographie de la Population, by PIERRE GEORGE. Institut National d'Études Démographiques, Travaux et Documents, Cahier No. 34. 229 pp.; maps, diagrs., tables. Presses Universitaires de France, Paris, 1959. 1,000 fr. 9½ x 6 inches.

In the not too distant past, the literature on population geography could best be described as an intermittent trickle. Now the recent, accelerating interest in population matters among geographers is reflected in a steadily broadening and deepening stream of publications. The appearance within a three-year period of these four substantial attempts to summarize the factual and theoretical content of the field bodes well for the future of this relatively new geographic specialty. The most impressive of these publications, in terms of both bulk and achievement, is Mme. Beaujeu-Garnier's two-volume tome which, for all its major and minor shortcomings, now stands as our most acceptable approximation of a monograph on the geography of population. This work is, by design, a regional rather than a systematic treatise. The 28 regional chapters happen to be preceded by three quite brief chapters which attempt, with only partial success, to characterize the nature of the field, its source materials, and the broader relationships between man and earth, and the second volume does close with a short statement on the future population problems of the world; but "Géographie de la Population" stands or falls on the merits of its regional essays.

On the whole—and within the limitations of available materials and the author's intentions—these essays tend to come off rather well. Mme. Beaujeu-Garnier has arranged the nations of the world into seven major areal or categorical groups, in order of treatment—Western Europe, those overseas lands dominated by European colonists (i.e., the United States, Canada, Australia, and New Zealand), Latin America, Africa, the Middle East, Monsoon Asia (sans China), and the Socialist nations. Within each of these broad groups, there is a further subdivision into major regions or nations; thus, for example, there are six chapters on Africa, two characterizing the entire continent, and one each on North Africa, Tropical Africa, South Africa, and Madagascar and neighboring islands. No standardized format is followed within the regional chapters—the character of the area is allowed to determine the order and emphasis placed on the various topics—but generally there is a statement of the distribution and other characteristics of the population, its history, changes, and migrational movements (with a recurrent stress on international migrations), the relevant facts of physical geography, economy, and culture; and whatever special local problems in the relationships among men or between men and physical milieu happen to involve the population factor. Maps, a limited but highly useful selection of statistics, and an occasional diagram or photograph supplement the text.

Mme. Beaujeu-Garnier triumphantly upholds the reputation French geographers have won for their skill at regional delineation through her artful use of language and expert manipulation of material. She is able to sketch complex geographical situations in a few bold strokes and to give the reader a powerful mental image of a society or landscape in surprisingly few words. There are, however, some major limitations in her achievement. She has chosen to rely almost solely on secondary sources of information, rather than working from the basic data. This decision may be pragmatically justified in terms of producing a badly needed reference work within a reasonable span of time, but there is a considerable sacrifice of depth and insight, even for such areas as Western Europe or North Africa where personal observations are drawn upon. On the other hand, in the case of Tropical Africa, where primary sources are weak and the serious student must rely heavily on indirect or secondary materials in any event, we have as intelligent and stimulating an analysis of the relationships among population, land, and culture as can be found anywhere. Another failing—if it can be fairly stated as such—is the fact that these regional essays tend to become general social geographies with something of a demographic flavor, rather than full-fledged population geographies. They do neatly support the thesis that a consideration of population char-

acteristics is one of the most effective ways of approaching the total human geography of an area; but nowhere, except possibly in the chapters on Western Europe or Israel, do we find anything resembling a full and intellectually satisfying discussion of the interactions between demographic traits and other geographic elements. It is almost unnecessary to point out that no single author could possibly hope to treat the population geography of all parts of the world equally well or in sufficient depth.

Anyone with a first-hand knowledge of areas discussed second-hand by Mme. Beaujeu-Garnier is certain to find errors of omission, fact, and interpretation. The general reader may note the relatively small amount of space devoted to Siberia and the Soviet Far East, parts of Southwest Asia, and Latin America (excusable perhaps because of the paucity of raw materials). It is a bit startling, for example, to see only one page given over to Turkey and Iran while Israel receives an entire chapter. On the other hand, the extended treatment of Western Europe (with an understandable preponderance of French examples) and of North Africa, though far from definitive, are richly rewarding and contain much original thought. Particularly interesting is the discussion of the effects of warfare on the historical demography of Europe and the analysis of montane depopulation. Among the various inadequacies culled at random, I might cite the relative inattention to recent war-induced migrations in Europe; some questionable comments on the relationships between climate and race; the apparent acceptance of De Castro's dubious pronouncements on diet and fecundity; the absence of any statement on the ethnic characteristics of Madagascar, Réunion, or Mauritius; and the rather unsatisfactory handling of American Negro population geography.

The numerous smaller maps scattered through the pages of this treatise are generally well drawn and reproduced; but, most regrettably, the more ambitious large, folded population dot maps of major regions must be marked down as cartographic misses. Their appearance is crude; symbols and details are coarse; background data are almost nil. It is mystifying to find no population maps at all furnished for Southwest Asia or for Africa nor any explanation in the text of the omission. These omitted or inadequate maps would not constitute nearly so serious a fault were it not for the fact that there is seldom, if ever, any good verbal statement of the distributional pattern of population within the text. But all these are relatively minor blemishes in view of the larger accomplishment, and the geographic profession owes Mme. Beaujeu-Garnier a deep debt of gratitude for her energy, skill, and scholarship in producing so substantial a monograph so early in the history of a young discipline.

Any discussion of Mme. Veyret-Verner's work is embarrassingly anticlimatic at this point. The avowed purpose of the book is to provide a brief synopsis of the work of Beaujeu-Garnier and of the major French demographers for the general student of population. In the first of its two parts there are discussions of the elements of demography—vital trends, population structure, types of population regime, and problems of underpopulation, overpopulation, and the population optimum—while the closing section furnishes a brief survey of world distributional patterns and the major population regions (but seldom on anything more detailed than a national basis).

From almost any viewpoint, this book is a failure. The reader's initial amazement at finding no maps of any kind is succeeded by shock at the amateurish quality of the graphs, which might charitably rate a C– in an undergraduate drafting course. A perusal of the text discloses no reason why the reader would not be better off in going directly to the major texts from which this book has been adapted. There are no new ideas; the treatment is shallow, repetitious, and boring; and there are alarming imbalances in the coverage of major topics. Thus we are treated to a long, undigested essay on the world distribution of adult population and page after page on the age structure of populations (evidently borrowed almost *in toto* from some earlier essays by the author), but almost nothing on any other aspect of population structure! There is great stress laid on the "index of vitality," a device created by the author and we find frequent allusions to the French Alps, an area on which the author has published extensively. In other words, what we are given is an anthology of Mme. Veyret-Verner's earlier research on population, limited in terms of both areal and topical coverage, pieced together awkwardly with ideas from other writers, with completely unsatisfactory results. The only positive comment to be made is that it is encouraging to find a publisher with such touching faith in the market demand for books on population geography.

The title of Kurt Witthauer's *Die Bevölkerung der Erde; Verteilung und Dynamik* does not give the potential reader too accurate an indication of its contents. As the fifteenth in the long series of Ergänzungs-Hefte zu Petermanns Geographischen Mitteilungen devoted to the topic of world population (the first was No. 33 by Behm and Wagner in 1872), this volume attempts to combine three functions—treatise on population geography, handbook on demographic methods, and statistical compendium—and succeeds only with the last. Much of the material in the first 81 pages consists of a rather elementary discussion of the rudiments of demography, the definition and measurement of population traits, and the importance of population study for the geographer. Perhaps the most interesting and useful passage is that detailing the history of efforts to estimate the

population of the world, by nation and continent, from 1650 to the present time and summarizing the results in a series of tables; this essay is, to the best of the reviewer's knowledge, the most thoroughgoing yet attempted on the subject.

The greater part of the book is given over to a country-by-country presentation of the latest population statistics for the world (some as recent as 1958), along with brief commentaries on the sources of the data and their significance. Whenever possible, there is a table containing population and area figures for the nation—and sometimes major subdivisions—from the earliest census or estimate to the most recent and another series on current population of cities, towns, and primary or secondary civil divisions, vital rates, and, occasionally, age structure. The thoroughness and industry that have gone into the collection and tabulation of information from hundreds of sources (in no less than 335 tables!) are greatly to be commended. This volume by no means supersedes the UN's *Demographic Yearbook*, but it does contain considerable material not to be found in that indispensable series; and the population geographer would be well advised to keep Witthauer's work on hand as a necessary supplement. Also deserving of praise are the 36 graphs and maps accompanying the text and the seven larger cartograms and graphs housed in a special pocket; they display appreciably more technical finesse and imagination than the illustrations used in the other three items reviewed here.

Considering this volume as a contribution to population science, I must note my disappointment not only in the skimpiness of the verbal analysis and its rather trivial level but also in a general statistical naïveté. Witthauer appears totally uninterested in the highly sophisticated techniques demographers have evolved for themselves and appears to believe, for example, that simple extrapolation of current trends is an adequate way of forecasting future populations. There is about the whole enterprise a strangely Nineteenth-Century air. The author's curiosity seems largely limited to the questions: How many people are there in the world and how fast is the population growing in various countries? There is little awareness of the multiplicity of factors shaping vital trends, of the complex interactions of population numbers and characteristics with so many of the other phenomena that interest the geographer, or of recent advanced thought on demographic problems.

Such scientific inertia is one fault that cannot be imputed to Pierre George. His new *Questions de Géographie de la Population* represents a marked advance in thought and approach over his earlier (1951) *Introduction à l'Étude Géographique de la Population du Monde*. This relatively succinct work (this reader for one wishes it were somewhat longer) is intended as a guide to the field for both the geographer and the general population scientist and stands in sharp contrast to Beaujeu-Garnier's opus by its emphasis on a world and systematic approach rather than the regional. The first of four sections deals adroitly with world patterns of gross quantitative distribution, racial groups, sex ratio, age structure, fertility, mortality, and natural increase. An extremely interesting second section is concerned with the inter-relationships between the facts of population on the one hand and physical geography, economic geography, and occupational structure on the other. George cuts the Gordian knot of physical vs. cultural determinism rather neatly by asserting that population size is largely a function of the food-producing capacity of a given environment in terms of a given culture; but, unfortunately, does not explore the implications of this thesis in any detail. The most brilliant writing in the volume is contained in the two chapters comprising Part 3 (entitled "Les Formes d'Implantation") in which George describes the settlement and population morphology of various types of agrarian and industrial societies in masterly fashion. The closing section deals with migration and with "turbulence," a term the author has coined to describe temporary or cyclical displacements of population.

There are a few negative comments that must be made about this major contribution by Pierre George. It is regrettable that so few bibliographic references are included and that almost all the specific local examples are drawn from French and Italian data. Most of the two dozen or so world maps accompanying the text are so generalized that the reader might be better off if the information were offered to him in tabular form. It is encouraging to note that the present work does definitely qualify as geography, whereas the earlier tome might justly have been classified as crypto-sociology. Here we have at least a start toward that complex analysis of fact, process, and larger implication that is genuine population geography. It is also pleasant to report the disappearance of that political truculence, the ideological chip on the shoulder that seriously marred George's first population treatise. The author does classify the nations of the world (and adhere to his classification with good effect), but in terms of level of demographic and economic development rather than primarily in terms of political systems. Another change—and one that reflects a rather rapid shift in the general intellectual climate of the past few years—is George's profound concern over the capacity of impoverished nations, which have suddenly achieved death control, to upgrade themselves economically as fast as they must in order to achieve demographic equilibrium at a decent level of living. We cannot characterize him as a Neo-Malthusian—here is a term that might as well be scrapped outright since the current world

situation has so little to do with the problems envisaged by Malthus—but George is now seriously worried about the ability of most of the nations of the world to provide for rapid, simultaneous growth in population numbers and economy.

By design or accident, George's volume neatly complements Beaujeu-Garnier's work. Although neither can be considered as a fully adequate statement of our knowledge of the field, taken together they go far toward remedying each other's deficiencies and constitute a better treatise on population geography than any single book yet in existence. It is a pity that these books are inaccessible to all but a few undergraduates—and graduates—in American colleges.

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Nepal: A Cultural and Physical Geography, by PRADYUMNA P. KARAN. 100 pp.; maps, sketches, ills., bibliogr. University of Kentucky Press, Lexington, 1960. $10.00. 14 x 10¾ inches.

With the financial assistance of the Ford Foundation, Pradyumna P. Karan and the University of Kentucky Press have given us the first geography of Nepal. It is a handsome volume, with its format arranged horizontally to accommodate some 34 maps, most of them on the scale of one inch to 40 miles, all but two prepared by the author. Supplemented by many photographs, most of which are also the work of Dr. Karan, the book is a visual delight. Since maps occupy one-third of the book's 100 oversized pages, Dr. Karan is certainly writing in the geographer's language, especially as the maps form an integral part of the text with minimal repetition in words of the information imparted cartographically. One might, however, ask for just one more map: showing the relations of Nepal's rivers, cities, towns, roads, trails, and airfields with those of near-by nations. The frontispiece, based on Lobeck's physiographic diagram, shows the relation of Nepal to all of Asia, but there is no map of intermediate scale showing the relation of Katmandu, Birganj, and Biratnagar to Calcutta, Patna, Delhi, or Lhasa, or of the Kosi to the Ganges. Even Sikkim and Bhutan have been slighted, leaving Nepal in something of a vacuum.

The only other serious omission is the lack of an index, though this is offset by the general brevity of the dozen chapters into which the text is divided. These chapters are topical or systematic: historical setting; political setting; physiography; climate, vegetation, and soil; land use and agriculture; population and settlement; cultural diversity; disease and diet; minerals, power, and industry; transportation and trade; plus a short summary of geographic regions. Such an organization has much to commend it. The general reader, the person looking for a quick reference, or the geographical specialist can turn to what interests him and quickly discover Nepal's position. It is good to have all this information on Nepal properly grouped and classified within the pages of one "cultural and physical geography."

On the other hand, this reviewer cannot help but wonder whether this profession is not developing a fixed geographic frame of reference, a sort of general formula into which it is only necessary to feed the proper data in order to come out with *the geography* of country X or Y. Not that this is inherently bad. If the funds were forthcoming, we could begin to run all of the newly emerging nations, as well as some of the old, neglected ones, through our formula, and come up with a set of reference works that would serve us as well as the Human Relations Area Files series serves the sociologists. Since the present period certainly seems to be the heyday of the small nation, the series might well run to some 50 or 60 volumes. But how many, within or without the profession, would wade through them?

This is not written in disparagement of Dr. Karan. His work is carefully done, clearly written, and comparatively short. It fills a definite gap. But the reader finds himself thinking that he had read much of this before. Problems of land tenure, soil erosion, overcutting of forests, overgrazing of grasslands, oversettlement of fertile valleys, poor agricultural practices, and declining yields are common from Spain to the Philippines, from Morocco to Mozambique, and from parts of the United States to Argentina. An embryonic transportation system aggravated by rugged topography, unknown and underdeveloped mineral resources, poorly capitalized local industry, a harassed bureaucracy struggling against illiteracy and political inexperience complicated by diverse ethnic, religious, and linguistic groups—need we go to far-off Nepal to find these handicaps acting in ugly concert against human dignity and the "good life?"

Only a self-centered dolt would want to ignore these problems, of course. Perhaps it is necessary to emphasize them in each country in order to provoke even a modicum of action towards solution. Perhaps such a series of geographical studies would help convince the United Nations and other aid-bearing agencies, international and national, that most of the problems of nine out of ten human beings are strikingly similar, regardless of nationality. Perhaps for the reader who is interested in Nepal but not in geography, Karan's approach will be an eye-opener and will lead to further investigation of the systematic factors in man's misery.

But for the geographer and the general reader who is fairly enlightened about the state of the

world and the condition of man, a geography of Nepal or any other small nation need not stress the factors and problems which are so common. Rather, its emphasis should be on those factors which differentiate the area under study and give it national or regional character. Karan includes these factors under their proper topical heading. But he does not, in my opinion, suffuse his study with them to the point that one clearly sees what makes Nepal unique, what sets it apart from India and Tibet, from Kashmir and Bhutan, or, for that matter, from Bolivia and Ethiopia.

The integrated approach which I am advocating used to be typified by the "French school" of geographers; it is now apparently dying out. If it is lost, we are in for some dull national geographies. This integrated approach cannot be achieved on the plane of physical geography and probably not on that of economic geography. It certainly can be used in cultural and political geography, and Nepal would make a fine case in point. Karan presents most of the relevant information, but he does not use it to animate an integrated picture of the country. One is left only with the impression that Nepal was a more or less haphazard creation established in its modern form by the Gurkhas between 1769 and 1800, whittled down by the British and Sikhs, and then left to wither as an isolated "buffer state" until the withdrawal of the British from India in 1947 forced the Ranas, and particularly the monarchy and non-Rana aristocracy, to rethink their position. Since the "revolution" of 1950–1951 and the growing concern of India with its northern frontier, the Nepali Congress Party, backed by Nehru, has been struggling to unify this 55,000-square-mile rectangle between the Ganges Plain and the High Himalaya. Because there is no national transportation network and very little national consciousness among Nepalese outside the Katmandu Valley, this is a vast undertaking. Aid has been obtained, to the extent of 80 per cent of the Nepalese budget, from India, the United States, the U.S.S.R., China, Japan, and several other nations, as well as from the United Nations. But the main Indian Project, that on the Kosi River, will benefit the donor more than Nepal. United States aid is coordinated with the Indians as well as with Nepal, an unusual feature, but except for some road work and the aerial ropeway between Katmandu and the Indian border it is scattered in areas remote from the capital, a more typical arrangement. As one might expect, Soviet aid stresses impact projects and transportation improvements where they can be seen, although the Russians have also completed aerial surveys for Nepal's first east-west highway. Until recently, Chinese aid has been in the form of financial grants, but the Chinese are now planning a cement plant and a paper factory. Chinese road-building has supposedly been limited to roads paralleling the border on the Tibetan side, but since this border has never been agreed upon, much less demarcated, it is not surprising that one road is said to run through Nepalese territory.

India is naturally worried by the fact that the Chinese command the high ground in Tibet, and so are some Nepalese. But Indian assurances that Nepal will somehow be defended cut both ways in Katmandu, as does the presence of Indian army and air force units. There are both pro-India and pro-China groups in Katmandu, and all parties have shown considerable sensitivity over the recruitment of Gurkha troops for either the Indian Army or the British forces in Southeast Asia.

While one certainly desires to avoid the typical American myopia of seeing all Asian developments in terms of the cold war, it would seem that an emphasis on the over-all political geographic problems of Nepal today could serve as a vital unifying theme in a study such as Karan's. These are fascinating questions, and ones which differentiate Nepal from other countries. Can a nation which lies, as it were, on a flight of steps leading up from the Terai or Gangetic Plain to the plateau of Tibet, overlapping some of the most formidable terrain on earth (which divides it into many small cultural and economical pockets), achieve national unity by the application of Twentieth Century technology? Can such a nation, which has long enjoyed *de jure* independence, achieve *de facto* independence under present conditions? Is there time and are there the resources to create a modern Nepal neither beholden to India nor occupied by China? Karan's book provides many clues to the answers, but it does not succeed in focussing on the questions.

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Boston: A Topographical History, by WALTER MUIR WHITEHILL. 244 pp.; maps, ills. The Belknap Press of Harvard University, Cambridge, Mass., 1959. $4.95. $9\frac{3}{4}$ x $6\frac{3}{4}$ inches.

The American city appears to the urban geographer from overseas to be rootless and routine. Consistently we cite nineteenth century commercial development to explain the nature of our cities, to the extent that it is often difficult even for the native to visualize American cities as distinct from the mass of urban centers which grew up in the new lands settled from western Europe. Although Carl Bridenbaugh two decades ago effectively destroyed the myth of the American city as solely an industrial age creature, we have tended to concentrate so doggedly on the nature of the present city that we have obscured our past. This past is interest-

ingly and carefully portrayed in a book recently issued with the imprint of Bostonian scholarship. Walter Muir Whitehill in addition to serving as director and librarian of a distinguished private library, the Boston Atheneum, seeks to turn our attention to the urban heritage we overlook. His book results from a series of eight Lowell Lectures delivered in the spring of 1958. This proper Bostonian background allows him to treat critically the influences of regional idiosyncrasy in the shaping of a city. Local conceptions of probity are imprinted on Boston as fully as profligacy on Dallas. And in this matter of the influence of regional attitudes we find the true measure of man's contribution to the frequently misunderstood composite we call topography.

Borrowing with acknowledgment from Bridenbaugh, Whitehill fixes Boston as a germinal metropolis at its time of foundation in 1630. The Puritans were city men who laid out a city, not so much on the narrow peninsula of Shawmut as in their minds. Even in colonial times Boston soon lost her numerical supremacy but replaced it with a conscious urbanity that no other American city has been able to match except for post-World War II San Francisco. This self-assurance has allowed Boston to develop confidently in her own image since the beginning. To the Bostonian, Jefferson's Law of the Primate City can only be thought part of the geopolitical nonsense of the late 'thirties. Growth in size does not necessarily supply missing components. It is unlikely to be sheer chance that Europeans commonly find the two American cities with the best developed local urban culture, Boston and San Francisco, also the most "human" and distinctive of our urban centers. That culture in the case of Boston has to an unusual degree created an aspect of physical integration largely lacking in our cities. Faneuil Hall was, and still is, both a workaday market and a place of ceremonial function. The State House in Boston may have served as a nearly universal prototype for American capitols but its intimate juxtaposition with housing and commerce is literally unique. Repeatedly, Boston shows her not quite medieval origin. As Whitehead points out, the strange parsimony of the true New Englander shows up in the placing of imposing buildings on cramped lots. This condition may also point up the fact that the belief that living in the center of the city was a part of civic responsibility never completely disappeared on Beacon Hill or along Marlborough Street. San Francisco shows a similar civic pride, but in a form which produced a scattering of institutions and a segregation of functions quite different from that found in Boston with a closer connection with European urban culture. The origins of this urban culture in Boston form the foundation of Whitehill's book; its physical expression, his subject.

In this book the shift from the Colonial to the Federalist city is fully detailed both in text and in fine illustrations. The earlier wooden city has largely been lost through fires but the later creation of brick and granite has been well preserved in the central parts of the city. And there we may visualize the cities described by the literary travelers of the early nineteenth century. The 75 years after the evacuation of the British were for Boston a time of change. Expansion of the physical site through large scale filling of tidal flats and the slow creation of the commercial district through the replacement of old residential districts created a metropolis where there had always been a town. With metropolitan stature went a desire for industry and on this subject Whitehill contributes substantially to the understanding of the geography of the industrial revolution in America. Boston's site was not an industrial one and despite efforts at the development of tidal power, in the absence of a Fall Line, the creation of local industry was slight in scale. This fact alone tells us much of the background of Lowell, Fall River, and Holyoke, Boston's industrial diaspora.

Turning to the present, *Boston: A Topographical History* discusses the impact of the dispersing city on the old center. Here perhaps the most serious limitation of the book is found. The intimate nature of Boston as a city places strictures on Whitehill. This last refuge of the urban pedestrian in the United States has always suffered from minds on foot. Parkman's Oregon Trail ended at the east foot of the Rockies just as Tichnor's Universe ended just west of Worcester. Whitehill's Boston ends at the Muddy River and we are told nothing of the proliferating suburbs, the magnificent park system of Olmstead, or the peopling of the agricultural wastes by the rural non-farm pioneers who have reshaped the New England countryside. But for the essential Boston the story is clear. Not everything is revered. Honesty in topographic history requires a full discussion of the ribald name of the city's Tramount. Idols both individual and corporate and the obsession with propriety are lovingly interred by the quotation from David McCord of the results attending the employment of the most correct architect by the most solid employer:

> Ralph Adams Cram
> One morning said damn,
> And designed the Urn Burial
> For a concern actuarial.

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